WT1800
Precision Power Analyzer Communication Interface
USER'S MANUAL

YOKOGAWA
Yokogawa Meters & Instruments Corporation

IM WT1801-17EN
1st Edition

Thank you for purchasing the WT1800 Precision Power Analyzer.
This Communication Interface User's Manual explains the following interface features and commands.

- Ethernet interface
- USB interface
- GP-IB interface

To ensure correct use, please read this manual thoroughly before operation.
Keep this manual in a safe place for quick reference in the event a question arises. The following manuals, including this one, are provided as manuals for the WT1800. Please read all the manuals.

Manual Title	Manual No.	Description
WT1800 Precision Power Analyzer Features Guide	IM WT1801-01EN	The supplied CD contains the PDF file of this manual. This manual explains all the WT1800 features other than the communication interface features.
WT1800 Precision Power Analyzer User's Manual	IM WT1801-02EN	The supplied CD contains the PDF file of this manual. The manual explains how to operate the WT1800.
WT1800 Precision Power Analyzer Getting Started Guide	IM WT1801-03EN	The manual explains the handling precautions and basic operations of the WT1800 and provides an overview of its features.
WT1800 Precision Power Analyzer Communication Interface User's Manual	IM WT1801-17EN	This manual. The supplied CD contains the PDF file of this manual. This manual explains the WT1800 communication interface features and how to use them.

Notes

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functionality. The figures given in this manual may differ from those that actually appear on your screen.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
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Revisions

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About the USB Interface and Ethernet Interface

- To use the USB communication features, your PC must have the following:
  - WT1800 library (TMCTL)
  - USB device driver for connecting the WT1800 to the PC
- To use the Ethernet communication features, your PC must have the following:
  - WT1800 library (TMCTL)

  You can download the library and driver from the following web page.
  http://tmi.yokogawa.com/

How to Use This Manual

Structure of the Manual

This manual contains six chapters and an appendix.

Chapter 1 Ethernet Interface

Describes the features and specifications of the Ethernet interface.

Chapter 2 USB Interface

Describes the features and specifications of the USB interface.

Chapter 3 GP-IB Interface

Describes the GP-IB interface features and specifications.

Chapter 4 Programming Overview

Describes command syntax and other programming information.

Chapter 5 Commands

Describes every command individually.

Chapter 6 Status Reports

Describes the status byte, various registers, and queues.

Appendix

Describes error messages and provides other information.

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Conventions Used in This Manual

Notes and Cautions

The notes and cautions in this manual are categorized using the following symbols.

WARNING Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

CAUTION Calls attention to actions or conditions that could cause light injury to the user or cause damage to the instrument or user's data, and precautions that can be taken to prevent such occurrences.

Note Calls attention to information that is important for proper operation of the instrument.

Character Notations

Panel Key Names and Soft Key Names in Bold Characters
Indicate panel keys that are used in the procedure and soft keys and menu items that appear on the screen.

SHIFT+Panel Key
When *SHIFT+panel key* appears in a procedural explanation, it means to press the shift key so that it illuminates, and then to press the indicated panel key. A setup menu for the item written in purple below the key that you pressed appears on the screen.

Unit

k	Denotes 1000. Example: 100 kHz
K	Denotes 1024. Example: 720 KB (file size)

Metasyntax

The following table contains the symbols that are used in the syntax discussed mainly in chapters 4 and 5. These symbols are referred to as BNF (Backus-Naur Form) symbols. For details on how to write data using these symbols, see pages 4-6 and 4-7.

Symbol	Description	Example	Example of Input
<>	A defined value	ELEMent<x> <x> = 1 to 6	ELEMENT2
{} |	Select an option in { } Exclusive OR	SQFormula {TYPE1|TYPE2|TYPE3}	SQFORMULA TYPE1
[]	Can be omitted	NUMeric[:NORMal]:VALue?	NUMERIC:VALUE?

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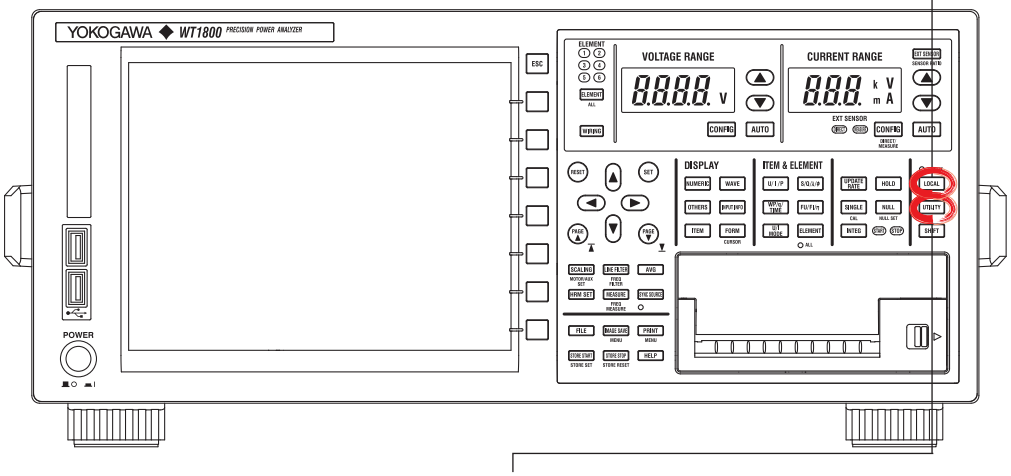
1.1 Component Names and Functions

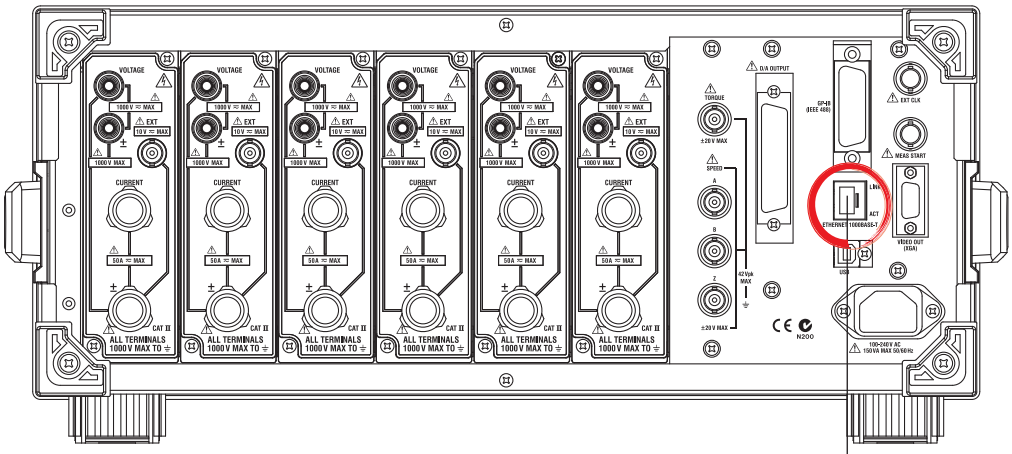
Front Panel

LOCAL key
Press this key to switch from remote mode, in which settings and operations are performed through remote commands, to local mode, in which operations can be performed using the WT1800 keys. This key is disabled when local lockout (see page 1-2) has been activated by a controller.



UTILITY key (page 1-5)
Press this key to set the network connection timeout setting.

Rear Panel



Ethernet port
This port is for connecting the WT1800 to a controller (such as a PC) using an Ethernet cable. For details on how to connect the WT1800 to a controller, see page 1-4.

1.2 Ethernet Interface Features and Specifications

Ethernet Interface Features

Reception Feature

You can use the reception feature to specify the same settings that you can specify by using the front panel keys.
The WT1800 can receive output requests for measured and computed data, panel setup parameters, and error codes.

Transmission Feature

The WT1800 can transmit measured and computed data.
The WT1800 can transmit panel setup parameters and the status byte.
The WT1800 can transmit error codes when errors occur.

Ethernet Interface Specifications

Electrical and mechanical specifications:	complies with IEEE802.3
Simultaneous connections:	1
Communication protocol:	TCP/IP (VXI-11)
Connector:	RJ-45

Switching between Remote and Local Modes

Switching from Local to Remote Mode

The WT1800 switches to remote mode when it is in local mode and it receives a `:COMMunicate:REMote ON` command from the PC.

- The REMOTE indicator illuminates.
- All keys except the **LOCAL** key are disabled.
- The local mode settings are retained even when the WT1800 switches to remote mode.

Switching from Remote to Local Mode

When the WT1800 is in remote mode and you press **LOCAL**, the WT1800 switches to local mode. However, this does not work if the WT1800 has received a `:COMMunicate:LOCKout ON` command from the PC. The WT1800 switches to local mode when it receives a `:COMMunicate:REMote OFF` command from the PC, regardless of the local lockout state.

- The REMOTE indicator turns off.
- Key operations are enabled.
- Settings entered in remote mode are retained even when the WT1800 switches to local mode.

Note

You cannot use the Ethernet interface simultaneously with other interfaces (GP-IB and USB interfaces).

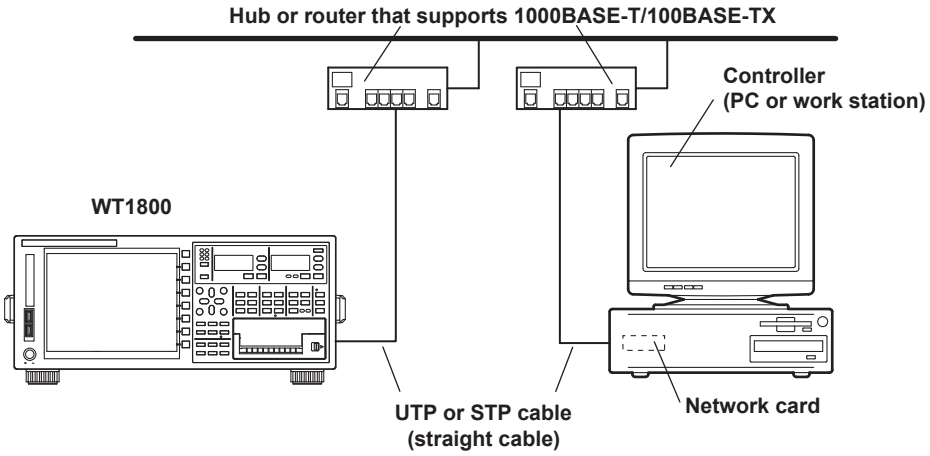
Setting the Timeout Value

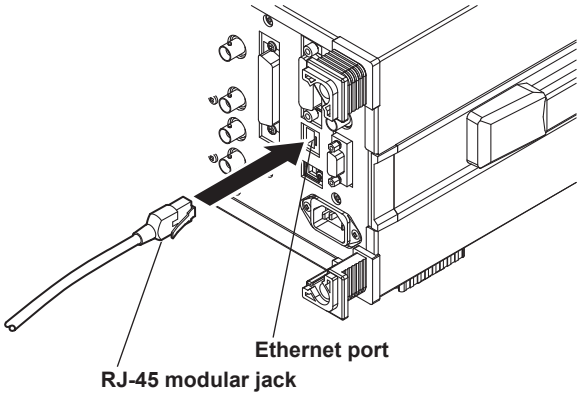
If the WT1800 is not accessed within a given period of time (specified by the timeout value), it will disconnect from the network. The timeout value can be set from 0 to 3600 s. The default value is 0 s.
For instructions on how to set the timeout value, see section 1.4, “Configuring the WT1800 Ethernet Settings.”

1.3 Connecting to the Ethernet Interface

Connection Procedure

Connect a UTP (Unshielded Twisted-Pair) or STP (Shielded Twisted-Pair) cable that is connected to a hub or other network device to the Ethernet port on the WT1800 rear panel.





Notes about Connections

- To connect the WT1800 to a PC, be sure to use straight cables and to connect through a hub or router. Proper operation is not guaranteed for a one-to-one connection using a crossover cable.
- Use a network cable that supports the data rate of your network.

Note

For details on how to connect the WT1800 to a network, see section 19.1, “Connecting the WT1800 to a Network” in the *WT1800 User’s Manual*, IM WT1801-02EN.

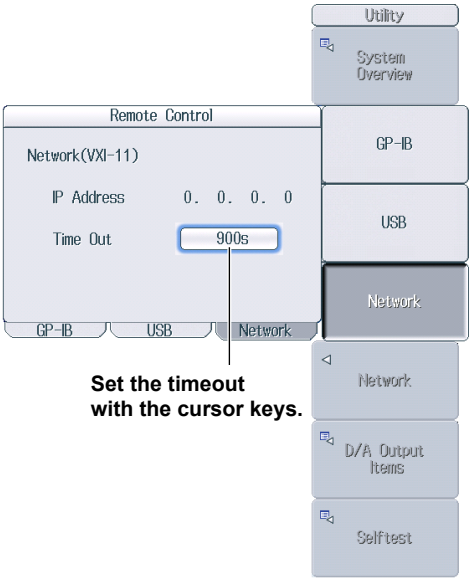
1.4 Configuring the WT1800 Ethernet Settings

This section explains the following setting for remotely controlling the WT1800 via the Ethernet interface:

- Network connection timeout setting

UTILITY Remote Control Menu

Press **UTILITY**, the **Remote Control** soft key, and then the **Network** soft key to display the following screen.



Note

Only use one communication interface: GP-IB, USB, or Network. If you send commands simultaneously from more than one communication interface, the WT1800 will not execute the commands properly.

TCP/IP Settings

To use the Ethernet interface, you must specify the following TCP/IP settings.

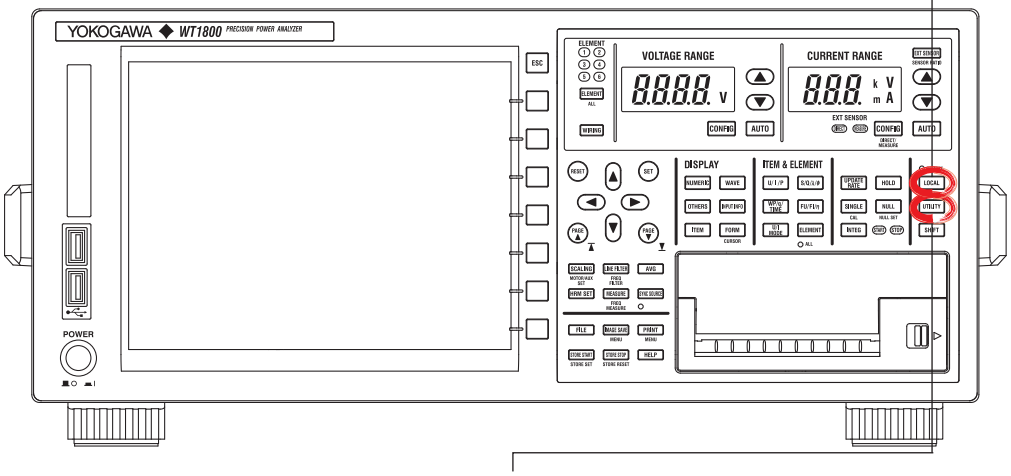
- IP address
- Subnet mask
- Default gateway

For instructions on how to specify these settings, see section 19.2, “Configuring TCP/IP Settings” in the *WT1800 User’s Manual*, IM WT1801-02EN.

2.1 Component Names and Functions

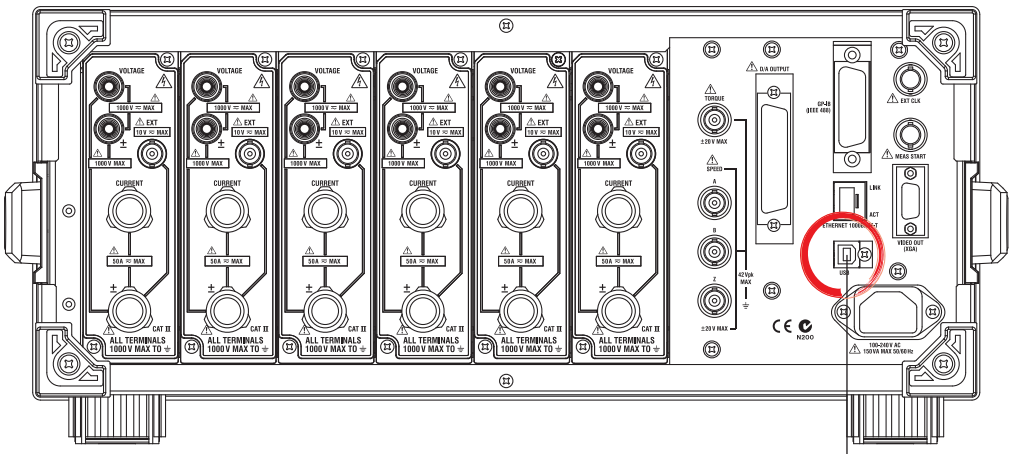
Front Panel

LOCAL key
Press this key to switch from remote mode, in which settings and operations are performed through remote commands, to local mode, in which operations can be performed using the WT1800 keys. This key is disabled when local lockout (see page 2-2) has been activated by a controller.



UTILITY key (page 2-4)
Press this key to view the serial number that is used in USB TMC communication.

Rear Panel



USB port
This port is for connecting the WT1800 to a controller (such as a PC) using a USB cable. For details on how to connect the WT1800 to a controller, see page 2-3.

2.2 USB Interface Features and Specifications

USB Interface Features

Reception Feature

You can use the reception feature to specify the same settings that you specify by using the front panel keys.
The WT1800 can receive output requests for measured and computed data, panel setup parameters, and error codes.

Transmission Feature

The WT1800 can transmit measured and computed data.
The WT1800 can transmit panel setup parameters and the status byte.
The WT1800 can transmit error codes when errors occur.

USB Interface Specifications

Electrical and mechanical specifications:	complies with USB Rev. 2.0
Connector:	type B connector (receptacle)
Number of ports:	1
Power supply:	self-powered
System requirements:	a PC with a USB port, running Windows 7 (32 bit), Windows Vista (32 bit), or Windows XP (32 bit, SP2 or later). A separate device driver is required to enable the connection with the PC.

Switching between Remote and Local Modes

Switching from Local to Remote Mode

The WT1800 switches to remote mode when it is in local mode and it receives a `:COMMunicate:REMote ON` command from the PC.

- The REMOTE indicator illuminates.
- All keys except the **LOCAL** key are disabled.
- The local mode settings are retained even when the WT1800 switches to remote mode.

Switching from Remote to Local Mode

When the WT1800 is in remote mode and you press **LOCAL**, the WT1800 switches to local mode. However, this does not work if the WT1800 has received a `:COMMunicate:LOCKout ON` command from the PC. The WT1800 switches to local mode when it receives a `:COMMunicate:REMote OFF` command from the PC, regardless of the local lockout state.

- The REMOTE indicator turns off.
- Key operations are enabled.
- Settings entered in remote mode are retained even when the WT1800 switches to local mode.

Note

You cannot use the USB interface simultaneously with other interfaces (GP-IB and Ethernet interfaces).

2.3 Connecting to the USB Interface

Notes about Connections

- Be sure to insert the USB cable connector firmly into the USB port.
- If you are connecting multiple devices by using a USB hub, connect the WT1800 to the USB hub port that is closest to the port that the controller is connected to.
- Do not connect or remove USB cables from the time when the WT1800 is turned on until operation becomes available (approximately 20 to 30 seconds). Doing so may damage the WT1800.

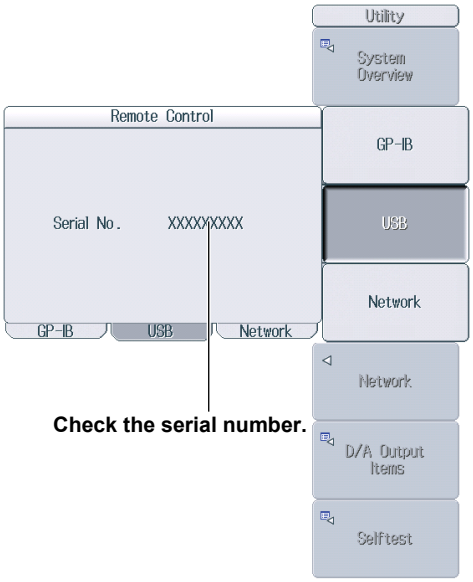
2.4 Configuring the WT1800 USB Settings

This section explains the following setting for controlling the WT1800 remotely through a USB interface:

- Viewing the serial number that is used in USB TMC communications

UTILITY Remote Control Menu

Press **UTILITY**, the **Remote Control** soft key, and then the **USB** soft key to display the following screen.



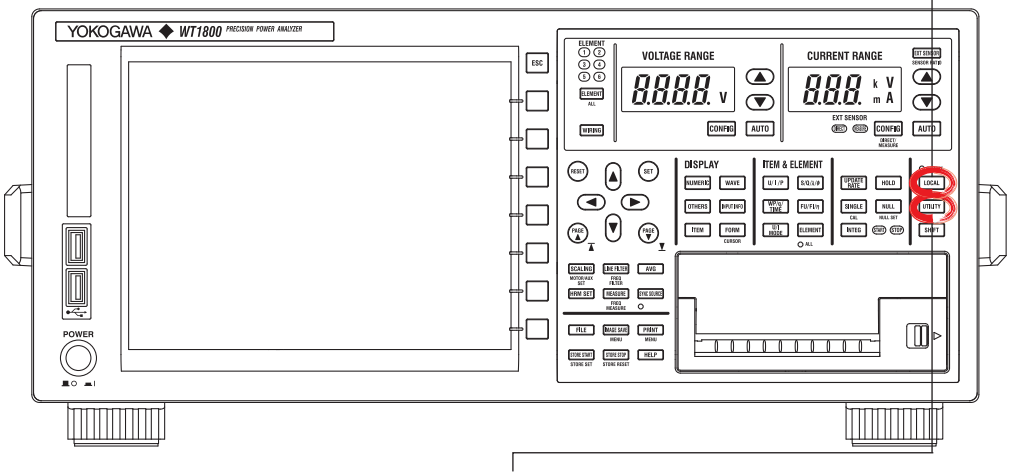
Note

- Only use one communication interface: GP-IB, USB, or Network. If you send commands simultaneously from more than one communication interface, the WT1800 will not execute the commands properly.
- Install the YOKOGAWA USB TMC (Test and Measurement Class) driver on your PC. For information about how to obtain the YOKOGAWA USB TMC driver, contact your nearest YOKOGAWA dealer. You can also access the YOKOGAWA USB driver download web page and download the driver.
  http://tmi.yokogawa.com/
- Do not use USB TMC drivers (or software) supplied by other companies.

3.1 Component Names and Functions

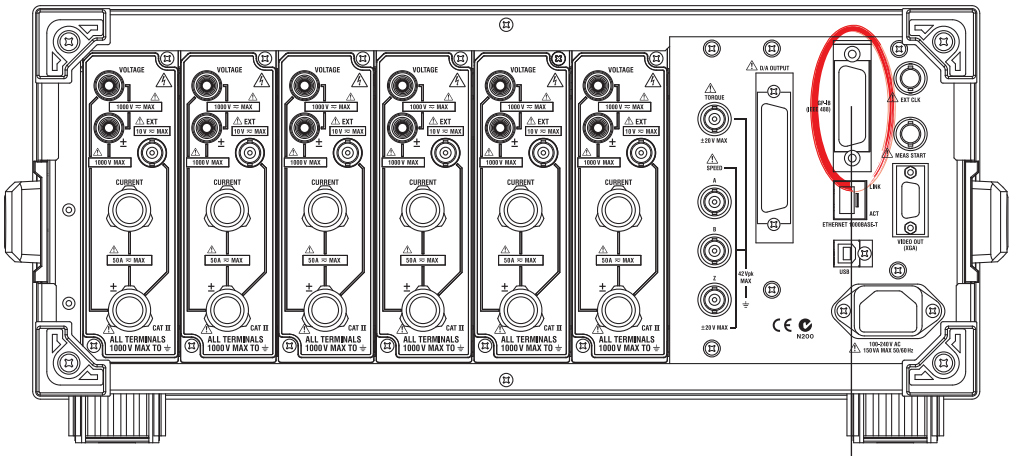
Front Panel

LOCAL key
Press this key to switch from remote mode, in which settings and operations are performed through remote commands, to local mode, in which operations can be performed using the WT1800 keys. This key is disabled when local lockout (see page 3-7) has been activated by a controller.



UTILITY key (page 3-6)
Press this key to set the GP-IB address.

Rear Panel



GP-IB port
This port is for connecting the WT1800 to a controller (such as a PC) using a GP-IB cable. For details on how to connect the WT1800 to a controller, see page 3-4.

3.2 GP-IB Interface Features and Specifications

GP-IB Interface Features

Listener Capability

- Allows you to specify the same settings that you can specify by using the front panel keys. This does not allow you to turn the power on and off or change communication settings.
- Output requests for measured and computed data, panel setup parameters, and error codes can be received.
- Commands such as status report commands can be received.

Talker Capability

The WT1800 can transmit measured and computed data.
The WT1800 can transmit panel setup parameters and the status byte.
The WT1800 can transmit error codes when errors occur.

Note

Talk-only, listen-only, and controller capabilities are not available on the WT1800.

GP-IB Interface Specifications

Supported Devices: National Instruments Corporation
- PCI-GPIB or PCI-GPIB+
- PCIe-GPIB or PCIe-GPIB+
- PCMCIA-GPIB or PCMCIA-GPIB+
- GPIB-USB-HS

Driver NI-488.2M Version 1.60 or later

Electrical and mechanical specifications: complies with IEEE St'd 488-1978
Functional specifications: See the following table.
Protocol: complies with IEEE St'd 488.2-1992
Code: ISO (ASCII) code
Mode: addressable mode
Address settings: Press **UTILITY**, and then on the **Remote Control** menu, set the communication interface (Device) to GP-IB and the address to a number from 0 to 30.
Clearing remote mode: Clear remote mode by pressing **LOCAL**.
This key is disabled when local lockout has been activated by a controller.

Functional Specifications

Function	Subset Name	Description
Source handshaking	SH1	Full source handshaking capability
Acceptor handshaking	AH1	Full acceptor handshaking capability
Talker	T6	Basic talker capability, serial polling, and untalk on MLA (My Listen Address). No talk-only capability.
Listener	L4	Basic listener capability, unlisten on MTA (My Talk Address), and no listen-only capability
Service request	SR1	Full service request capability
Remote local	RL1	Full remote/local capability
Parallel polling	PP0	No parallel poll capability
Device clear	DC1	Full device clear capability
Device trigger	DT1	Device trigger capability
Controller	C0	No controller capability
Electric characteristics	E1	Open collector

Switching between Remote and Local Modes

Switching from Local to Remote Mode

The WT1800 switches to remote mode when it is in local mode and it receives a REN (Remote Enable) message from the PC.

- The REMOTE indicator illuminates.
- All keys except the **LOCAL** key are disabled.
- The local mode settings are retained even when the WT1800 switches to remote mode.

Switching from Remote to Local Mode

When the WT1800 is in remote mode and you press **LOCAL**, the WT1800 switches to local mode. This key combination is disabled if the local lockout state (see page 3-7 for details) has been activated by a controller.

- The REMOTE indicator turns off.
- Key operations are enabled.
- Settings entered in remote mode are retained even when the WT1800 switches to local mode.

Note

You cannot use the GP-IB interface simultaneously with other interfaces (USB and Ethernet interfaces).

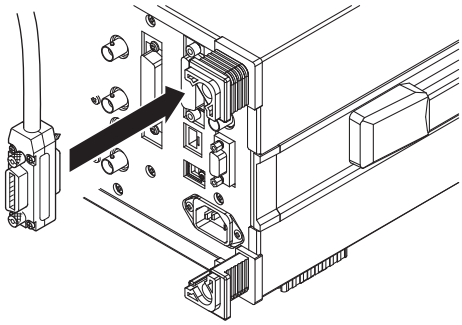
3.3 Connecting to the GP-IB Interface

GP-IB Cable

The WT1800 is equipped with an IEEE St'd 488-1978 24-pin GP-IB connector. Use GP-IB cables that comply with IEEE St'd 488-1978.

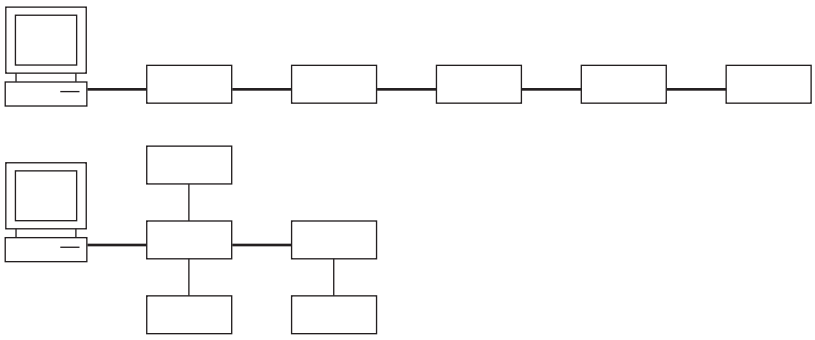
Connection Procedure

Connect the cable as shown below.



Notes about Connections

- Firmly tighten the screws on the GP-IB cable connector.
- On the PC end, use a GP-IB board (or card) made by National Instruments. For details, see section 3.2.
- The WT1800 may not operate properly if the WT1800 is connected to the PC through converters (such as a GP-IB to USB converter). For more details, contact your nearest YOKOGAWA dealer.
- Several cables can be used to connect multiple devices. However, no more than 15 devices, including the controller, can be connected on a single bus.
- When connecting multiple devices, you must assign a unique address to each device.
- Use cables that are 2 m or shorter in length to connect devices.
- Make sure the total length of all cables does not exceed 20 m.
- When devices are communicating, have at least two-thirds of the devices on the bus turned on.
- To connect multiple devices, use a star or daisy-chain configuration as shown below. Loop and parallel configurations are not allowed.



CAUTION

Be sure to turn off the PC and the WT1800 when connecting or removing communication cables. Otherwise, erroneous operation may result, or the internal circuitry may break.

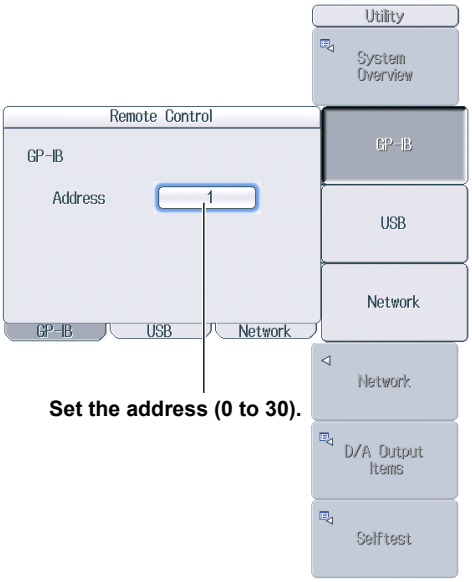
3.4 Configuring the WT1800 GP-IB Settings

This section explains the following setting for controlling the WT1800 remotely through a GP-IB interface:

- GP-IB address

UTILITY Remote Control Menu

Press **UTILITY**, the **Remote Control** soft key, and then the **GP-IB** soft key to display the following screen.



Note

- Only use one communication interface: GP-IB, USB, or Network. If you send commands simultaneously from more than one communication interface, the WT1800 will not execute the commands properly.
- When the controller is communicating with the WT1800 or with other devices through GP-IB, do not change the address.
- Each device that is connected by GP-IB has its own unique address in the GP-IB system. This address is used to distinguish one device from other devices. Therefore, you must assign a unique address to the WT1800 when connecting it to a PC or other device.

3.5 Responses to Interface Messages

Responses to Interface Messages

Responses to Uni-Line Messages

- **IFC (Interface Clear)**
  Clears the talker and listener functions. Stops data transmission if it is in progress.
- **REN (Remote Enable)**
  Switches between the remote and local modes.

  IDY (Identify) is not supported.

Responses to Multi-Line Messages (Address commands)

- **GTL (Go To Local)**
  Switches the instrument to local mode.
- **SDC (Selected Device Clear)**
  - Clears the program message (command) being received and the output queue (see page 6-6 for details).
  - Discards `*OPC` and `*OPC?` commands that are being executed.
  - Immediately aborts `*WAI` and `COMMunicate:WAIT` commands.
- **GET (Group Execute Trigger)**
  The same operation as the `*TRG` command.

  PPC (Parallel Poll Configure) and TCT (Take Control) are not supported.

Responses to Multi-Line Messages (Universal commands)

- **LLO (Local Lockout)**
  Prohibits switching to local mode by disabling the LOCAL key on the front panel.
- **DCL (Device Clear)**
  The same operation as the SDC message.
- **SPE (Serial Poll Enable)**
  Sets the talker function on all devices on the bus to serial polling mode. The controller will poll each device in order.
- **SPD (Serial Poll Disable)**
  Clears the serial polling mode of the talker function on all devices on the bus.

  PPU (Parallel Poll Unconfigure) is not supported.

What Are Interface Messages?

Interface messages are also referred to as interface commands or bus commands. They are commands that are issued by the controller. They are classified as follows:

Uni-Line Messages

A single control line is used to transmit uni-line messages. The following three messages are available.

- IFC (Interface Clear)
- REN (Remote Enable)
- IDY (Identify)

Multi-Line Messages

Eight data lines are used to transmit multi-line messages. The messages are classified as follows:

- **Address Commands**

  These commands are valid when the instrument is designated as a listener or as a talker. The following five commands are available.

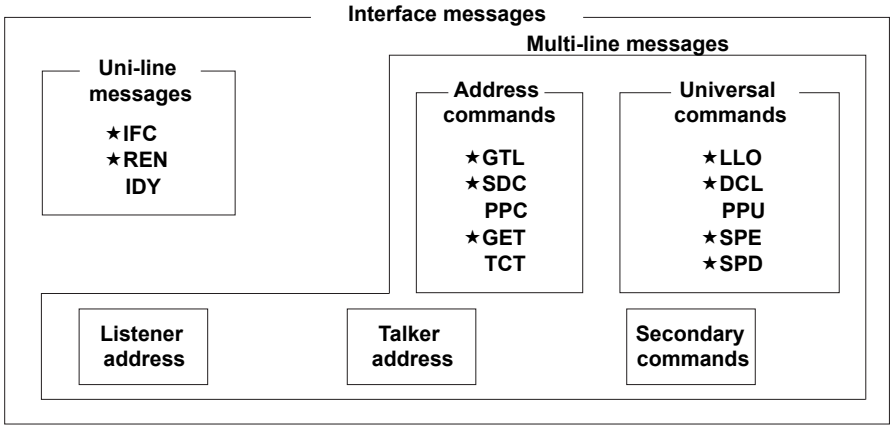
  Commands available to a device designated as a listener
  - GTL (Go To Local)
  - SDC (Selected Device Clear)
  - PPC (Parallel Poll Configure)
  - GET (Group Execute Trigger)

  Commands available to a device designated as a talker
  - TCT (Take Control)

- **Universal Commands**

  These commands are valid on all instruments regardless of their listener or talker designation. The following five commands are available.
  - LLO (Local Lockout)
  - DCL (Device Clear)
  - PPU (Parallel Poll Unconfigure)
  - SPE (Serial Poll Enable)
  - SPD (Serial Poll Disable)

There are other interface messages: listener-address, talk-address, and secondary commands.



The WT1800 supports interface messages marked with a ★.

Note

Difference between SDC and DCL

In multi-line messages, SDC messages are address commands that require talker or listener designation and DCL messages are universal commands that do not require a designation. Therefore, SDC messages are directed at a particular instrument while DCL messages are directed at all instruments on the bus.

4.1 Messages

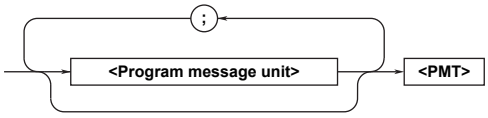
Messages

Messages are used to exchange information between the controller and the WT1800. Messages that are sent from the controller to the WT1800 are called program messages, and messages that are sent from the WT1800 back to the controller are called response messages.

If a program message contains a command that requests a response (query), the WT1800 returns a response message upon receiving the program message. The WT1800 returns a single response message in response to a single program message.

Program Messages

The program message format is shown below.



<Program Message Unit>

A program message consists of one or more program message units. Each unit corresponds to one command. The WT1800 executes the commands in the order that they are received.

Separate each program message unit with a semicolon.

For details on the program message syntax, see the next section.

Example

```
:INPut:CFACtor 3;INDependent OFF<PMT>
```

Unit Unit

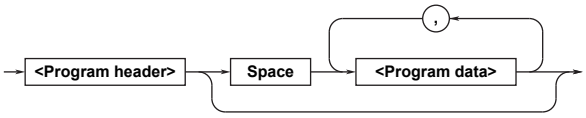
<PMT>

<PMT> is a program message terminator. The following three terminators are available.

NL (new line):	Same as LF (line feed). ASCII code "0AH"
^END:	The END message as defined by IEEE 488.1. (The data byte that is sent with the END message is the last data byte of the program message.)
NL^END:	NL with an END message attached. (NL is not included in the program message.)

Program Message Unit Syntax

The program message unit syntax is shown below.



<Program Header>

The program header indicates the command type. For details, see page 4-3.

<Program Data>

Attach program data if there are conditions that are required to execute a command. Separate the program data from the header with a space (ASCII code "20H"). If there are multiple data values, separate each data value with a comma.

For details, see page 4-6.

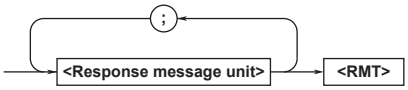
Example

```
:INPut:CFACtor 3<PMT>
```

Header Data

Response Messages

The response message syntax is as follows:



<Response Message Unit>

A response message consists of one or more response message units; each response message unit corresponds to one response.

Separate each response message unit with a semicolon.

For details on the response message syntax, see the next page.

Example

```
:INPUT:CFACTOR 3;INDEPENDENT 0<RMT>
```

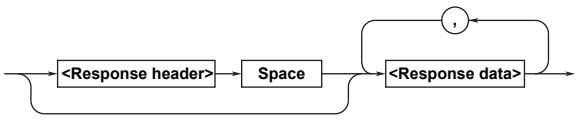
Unit Unit

<RMT>

RMT stands for "response message terminator." The response message terminator is NL^END.

Response Message Unit Syntax

The response message unit syntax is as follows:



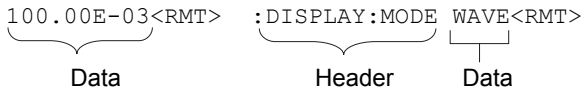
<Response Header>

A response header sometimes precedes the response data. Separate the data from the header with a space. For details, see page 4-5.

<Response Data>

Response data contains the content of the response. If there are multiple data values, each data value is separated by a comma. For details, see page 4-5.

Example



If there are multiple queries in a program message, responses are returned in the same order that the queries were received in. In most cases, a single query returns a single response message unit, but there are a few queries that return multiple units. The first response message unit always corresponds to the first query, but the nth response unit may not necessarily correspond to the nth query. Therefore, if you want to make sure that every response is retrieved, divide the program messages into individual messages.

Precautions to Be Taken when Sending and Receiving Messages

- If the controller sends a program message that does not contain a query, the controller can send the next program message at any time.
- If the controller sends a program message that contains a query, the controller must finish receiving the response message before it can send the next program message. If the controller sends the next program message before receiving the response message in its entirety, an error will occur. A response message that is not received in its entirety will be discarded.
- If the controller tries to receive a response message when there is none, an error will occur. If the controller tries to receive a response message before the transmission of the program message is complete, an error will occur.
- If the controller sends a program message containing multiple message units, but the message contains incomplete units, the WT1800 will try to execute the ones that are believed to be complete. However, these attempts may not always be successful. In addition, if such a message contains queries, the WT1800 may not necessary return responses.

Deadlock

The WT1800 can store at least 1024 bytes of messages in its transmit and receive buffers (the number of available bytes varies depending on the operating conditions). If both the transmit and receive buffers become full at the same time, the WT1800 will no longer be able to operate. This condition is called a deadlock. If this happens, you can resume operation by discarding response messages.

Deadlock will not occur if the program message (including the <PMT>) is kept below 1024 bytes. Program messages that do not contain queries never cause deadlocks.

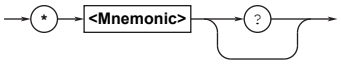
4.2 Commands

Commands

There are three types of commands (program headers) that a controller may send to the WT1800. The commands differ in their program header formats.

Common Command Header

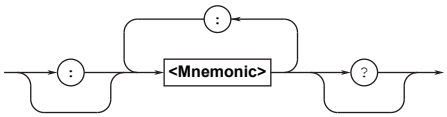
Commands that are defined in IEEE 488.2-1992 are called common commands. The common command header syntax is shown below. Be sure to include an asterisk (*) at the beginning of a common command.



Common command example: `*CLS`

Compound Header

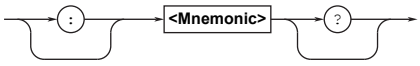
Commands, other than common commands, that are specific to the WT1800 are classified and arranged in a hierarchy according to their functions. The compound header syntax is shown below. Be sure to use a colon to specify a lower hierarchical level.



Compound header example: `:DISPlay:MODE`

Simple Header

These commands are functionally independent and are not contained within a hierarchy. The format of a simple header is shown below.



Simple header example: `:HOLD`

Note

A <mnemonic> is an alphanumeric character string.

When Concatenating Commands

- **Command Groups**
  A command group is a group of commands that have common compound headers arranged in a hierarchy. A command group may contain sub-groups.

  Example A portion of the commands from the integration command group

```
:INTEGrate?
:INTEGrate:MODE
:INTEGrate:TIMer
:INTEGrate:RTIMe?
:INTEGrate:RTIMe:STARt
:INTEGrate:RTIMe:END
:INTEGrate:ACAL
:INTEGrate:STARt
:INTEGrate:STOP
:INTEGrate:RESet
```

- **When Concatenating Commands of the Same Group**
  The WT1800 stores the hierarchical level of the command that is currently being executed and processes the next command on the assumption that it belongs to the same level. Therefore, the common header section can be omitted for commands that belong to the same group.

  Example
```
:INTEGrate:MODE NORMal;
ACAL ON<PMT>
```

- **When Concatenating Commands of Different Groups**
  If the subsequent command does not belong to the same group, place a colon in front of the header (this colon cannot be omitted).

  Example
```
:INTEGrate:MODE NORMal;:
DISPlay:MODE NUMeric<PMT>
```

- **When Concatenating Simple Headers**
  If a simple header follows another command, place a colon in front of the simple header (this colon cannot be omitted).

  Example
```
:INTEGrate:MODE NORMal;:
HOLD ON<PMT>
```

- **When Concatenating Common Commands**
  Common commands that are defined in IEEE 488.2-1992 are independent of hierarchy. There is no need to use a colon.

  Example
```
:INTEGrate:MODE NORMal;*CLS;
ACAL ON<PMT>
```

- **When Separating Commands with <PMT>**
  If you separate two commands with a terminator, two program messages will be sent. Therefore, the common header must be specified for each command even when commands belonging to the same command group are being concatenated.

  Example
```
:INTEGrate:MODE NORMal<PMT>:
INTEGrate:ACAL ON<PMT>
```

Upper-Level Query

An upper-level query is a query that is made by appending a question mark to the highest level command of a group. The controller can receive all of the settings in a group collectively by executing an upper-level query. Some upper-level queries of a group, which may be comprised of more than three hierarchical levels, can cause the WT1800 to transmit all the lower level settings.

Example : `INTEGrate?<PMT> -> :INTEGRATE:MODE NORMAL;TIMER 0,0,0;ACAL 0<RMT>`

The response to an upper-level query can be sent back to the WT1800 as a program message. This enables the settings that were present when the upper-level query was made to be reproduced later on. However, some upper-level queries do not return setup parameters that are not currently in use. Exercise caution because not all of a group's information is necessarily returned in a response.

Header Interpretation Rules

The WT1800 interprets the header that it receives according to the rules below.

- Mnemonics are not case sensitive.
  Example "`CURSor`" can be written as "`cursor`" or "`Cursor.`"
- The lower-case characters can be omitted.
  Example "`CURSor`" can be written as "`CURSO`" or "`CURS.`"
- The question mark at the end of a header indicates that it is a query. You cannot omit the question mark.
  Example The shortest abbreviation for "`CURSor?`" is "`CURS?.`"
- If the <x> (value) at the end of a mnemonic is omitted, it is interpreted as a 1.
  Example If "`ELEMent<x>`" is written as "`ELEM,`" it means "`ELEMent1.`"
- Parts of commands and parameters enclosed in square brackets ([ ]) can be omitted.
  Example "`[:INPut]SCALing[:STATe][:ALL]ON`" can be written as "`SCAL ON.`"
  However, the last section enclosed in square brackets cannot be omitted in an upper-level query.
  Example: "`SCALing?`" and "`SCALing:STATe?`" are different queries.

4.3 Responses

Responses

When the controller sends a query (a command with a question mark), the WT1800 returns a response message to the query. The WT1800 returns response messages in one of the following two forms.

- **Response Consisting of a Header and Data**
  Responses that can be used as program messages without any changes are returned with command headers attached.
  Example `:DISPlay:MODE?<PMT> -> :DISPLAY:MODE WAVE<RMT>`
- **Response Consisting Only of Data**
  Responses that cannot be used as program messages unless changes are made (query-only commands) are returned without headers. However, there are query-only commands whose responses the WT1800 will attach headers to.
  Example `[:INPut]:POVer?<PMT> -> 0<RMT>`

If You Want the WT1800 to Return Responses without Headers

You can configure the WT1800 so that even responses that have both headers and data are returned without headers. Use the `COMMunicate:HEADer` command for this purpose.

Abbreviated Form

The WT1800 normally returns response headers with the lower-case section removed. You can configure the WT1800 so that full headers are returned. Use the `COMMunicate:VERBose` command for this purpose. The sections enclosed in square brackets ([ ]) are also omitted in the abbreviated form.

4.4 Data

Data

Data contains conditions and values that are written after the header. A space separates the data from the header. Data is classified as follows:

Data	Meaning
<Decimal>	A value expressed in decimal notation (Example: VT ratio setting `->[:INPut]:SCALing:VT: ELEMent1 100`)
<Voltage><Current> <Time><Frequency>	A physical value (Example: Voltage range setting `->[:INPut]:VOLTage:RANGE: ELEMent1 100V`)
<Register>	A register value expressed as binary, octal, decimal, or hexadecimal (Example: Extended event register value `->:STATUS:EESE #HFE`)
<Character data>	Predefined character string (mnemonic). Select from the available strings in braces. (Example: Trigger mode selection `->:DISPlay:WAVE:TRIGger: MODE {AUTO|NORMal|OFF}`)
<Boolean>	Indicates on and off. Specify ON, OFF, or a value. (Example: Turning data hold on `->:HOLD ON`)
<String data>	User-defined string (Example: User-defined function `->:MEASure:FUNCtion1: EXPRession "URMS(E1)"`)
<Filename>	Indicates a file name. (Example: Save file name `->:FILE:SAVE: SETup[:EXECute] "CASE1"`)
<Block data>	Data that contains 8-bit values (Example: Response to acquired waveform data `-> #40012ABCDEFGHIJKL`)

<Decimal>

<Decimal> indicates a value expressed as a decimal number, as shown in the table below. Decimal values are written in the NR form as specified in ANSI X3.42-1975.

Symbol	Meaning	Example		
<NR1>	Integer	`125`	`-1`	`+1000`
<NR2>	Fixed-point number	`125.0`	`-.90`	`+001.`
<NR3>	Floating-point number	`125.0E+0`	`-9E-1`	`+.1E4`
<NRf>	Any form from <NR1> to <NR3>			

- The WT1800 can receive decimal values that are sent from the controller in any form, from <NR1> to <NR3>. This is expressed as <NRf>.
- The WT1800 returns a response to the controller in one of the forms from <NR1> to <NR3> depending on the query. The same form is used regardless of the size of the value.
- For the <NR3> form, the plus sign after the “E” can be omitted. You cannot omit the minus sign.
- If a value outside the range is entered, the value is adjusted to the closest value within the range.
- If a value has more significant digits than are available, the value will be rounded.

<Voltage>, <Current>, <Time>, and <Frequency>

<Voltage>, <Current>, <Time>, and <Frequency> indicate decimal values that have physical significance. A <Multiplier> or <Unit> can be attached to the <NRf> form that was described earlier. The following types of expressions are possible.

Form	Example
<NRf><Multiplier><Unit>	`5MV`
<NRf><Unit>	`5E-3V`
<NRf><Multiplier>	`5M`
<NRf>	`5E-3`

<Multiplier>

<Multipliers> that you can use are indicated in the following table.

Symbol	Word	Multiplier
EX	Exa	10^{18}
PE	Peta	10^{15}
T	Tera	10^{12}
G	Giga	10^{9}
MA	Mega	10^{6}
K	Kilo	10^{3}
M	Milli	10^{-3}
U	Micro	10^{-6}
N	Nano	10^{-9}
P	Pico	10^{-12}
F	Femto	10^{-15}

<Unit>

<Units> that you can use are indicated in the following table.

Symbol	Word	Meaning
V	Volt	Voltage
A	Ampere	Current
S	Second	Time
HZ	Hertz	Frequency
MHZ	Megahertz	Frequency

- <Multiplier> and <Unit> are not case sensitive.
- “U” is used to indicate micro (“μ”).
- “MA” is used for Mega to distinguish it from Milli. However, “MA” is interpreted as milliampere for current. In addition, megahertz is expressed as “MHZ.” Therefore, “M (Milli)” cannot be used for frequencies.
- If both <Multiplier> and <Unit> are omitted, the basic unit (V, A, S, or HZ) is used.
- Response messages are always expressed in the <NR3> form. Additionally, they are returned using the basic units, without a multiplier or unit attached.

<Register>

<Register> is an integer that can be expressed in decimal, hexadecimal, octal, or binary notation. It is used when each bit of the value has a particular meaning. The following types of expressions are possible.

Form	Example
<NRf>	1
#H<Hexadecimal value made up of the digits 0 to 9 and A to F>	#H0F
#Q<Octal value made up of the digits 0 to 7>	#Q777
#B<Binary value made up of the digits 0 and 1>	#B001100

- <Register> is not case sensitive.
- Response messages are always expressed in the <NR1> form.

<Character Data>

<Character data> is a predefined character string (a mnemonic). It is mainly used to indicate that an option listed as a character string in braces must be selected and entered. The data interpretation rules are the same as those described in “Header Interpretation Rules” on page 4-4.

Form	Example
{AUTO|NORMal}	AUTO

- As with the header, the COMMunicate:VERBose command can be used to select whether to return the response in the full form or in the abbreviated form.
- The COMMunicate:HEADer setting does not affect <character data>.

<Boolean>

<Boolean> is data that indicates ON or OFF. The following types of expressions are possible.

Form	Example
{ON|OFF|<NRf>}	ON OFF 1 0

- When <Boolean> is expressed in the <NRf> form, “OFF” is selected if the rounded integer value is 0, and “ON” is selected for all other cases.
- A response message is always returned with a 1 if the value is ON and with a 0 if the value is OFF.

<String Data>

<String data> is not a predefined character string like <character data>. It can be any character string. The character string must be enclosed in single quotation marks (') or double quotation marks (").

Form	Example
<String data>	'ABC' "IEEE488.2-1992"

- If a character string contains a double quotation mark ("), the double quotation mark is expressed as two consecutive quotation marks (""). This rule also applies to single quotation marks.
- A response message is always enclosed in double quotation marks (").
- <String data> is any character string. Therefore, the instrument assumes that the remaining program message units are part of the character string if no closing single (') or double quotation mark (") is encountered. As a result, no error is detected if a quotation mark is omitted.

<Block Data>

<Block data> is any 8-bit data. It is only used in response messages on the WT1800. The syntax is as follows:

Form	Example
#N<N-digit decimal number><data byte sequence>	#800000010ABCDEFGHIJ

- #N
  Indicates that the data is <block data>. “N” indicates the number of succeeding data bytes (digits) in ASCII code.
- <N-digit decimal number>
  Indicates the number of bytes of data (example: 00000010 = 10 bytes).
- <Data byte sequence>
  Expresses the actual data (example: ABCDEFGHIJ).
- Data is comprised of 8-bit values (0 to 255). This means that the ASCII code “0AH,” which stands for “NL,” can also be included in the data. Hence, care must be taken when programming the controller.

4.5 Synchronization with the Controller

Overlap Commands and Sequential Commands

There are two types of commands: overlap and sequential. The execution of one overlap command can start before the execution of the previous overlap command is completed.

If you specify the voltage range and send the next program message while you are querying the result, the WT1800 always returns the most recent setting (100 V in this case).

```
:INPut:VOLTage:RANGe;ELEMent1 100V;
ELEMent?<PMT>
```

This is because the next command is forced to wait until the processing of `:INPut:VOLTage:RANGe;ELEMent1` is completed. This type of command is called a sequential command.

Let us assume you send the next program message when you want to load a file and query the voltage range of the result.

```
:FILE:LOAD:SETup" FILE1";:INPut:VOLTage:
RANGe:ELEMent1?
```

In this case, `:INPut:VOLTage:RANGe:ELEMent1?` is executed before the loading of the file is completed, and the voltage range that is returned is the value before the file is loaded.

Overlapping refers to the act of executing the next command before the processing of the current command is completed, such as in the command `FILE:LOAD:SETup`. A command that operates in this way is called an overlap command.

You can prevent overlapping by using the following methods.

Synchronizing to Overlap Commands

- **Using the *WAI command**

  The `*WAI` command holds the subsequent commands until the overlap command is completed.

  Example
  ```
  :COMMunicate:OPSE #H0040;:
  FILE:LOAD:SETup "FILE1";*WAI;:
  INPut:VOLTage:RANGe:
  ELEMent1?<PMT>
  ```

  The `COMMunicate:OPSE` command is used to select which command to apply `*WAI` to. Here, it is applied to the media access command.

  `*WAI` is executed before `:INPut:VOLTage:RANGe:ELEMent1?`, so `:INPut:VOLTage:RANGe:ELEMent1?` is not executed until the file loading is completed.

- **Using the COMMunicate:OVERlap command**

  The `COMMunicate:OVERlap` command enables (or disables) overlapping.

  Example
  ```
  :COMMunicate:OVERlap #HFFBF;:
  FILE:LOAD:SETup "FILE1";:
  INPut:VOLTage:RANGe:
  ELEMent1?<PMT>
  ```

  `COMMunicate:OVERlap #HFFBF` enables overlapping for commands other than media access. Because overlapping of file loading is disabled, `FILE:LOAD:SETup` operates in the same way as a sequential command. Thus, `:INPut:VOLTage:RANGe:ELEMent1?` is not executed until file loading is completed.

- **Using the *OPC command**

  The `*OPC` command sets the OPC bit, which is bit 0 in the standard event register (see page 6-4 for details), to 1 when the overlapping is completed.

  Example
  ```
  :COMMunicate:OPSE #H0040;
  *ESE 1;*ESR?;*SRE 32;:FILE:
  LOAD:SETup "FILE1";*OPC<PMT>
  (Read the response to*ESR?)
  (Wait for a service request)
  :INPut:VOLTage:RANGe:
  ELEMent1?<PMT>
  ```

  The `COMMunicate:OPSE` command is used to select which command to apply `*OPC` to. Here, it is applied to the media access command.

  `*ESE 1` and `*SRE 32` indicate that a service request is only generated when the OPC bit becomes 1.

  `*ESR?` clears the standard event register.

  In the example above, `:INPut:VOLTage:RANGe:ELEMent1?` is not executed until a service request is generated.

- **Using the *OPC? query**

  The `*OPC?` query generates a response when an overlapping operation is completed.

  Example
  ```
  :COMMunicate:OPSE #H0040;
  :FILE:LOAD:SETup "FILE1";
  *OPC?<PMT>
  (Read the response to *OPC?)
  :INPut:VOLTage:RANGe:
  ELEMent?<PMT>
  ```

The COMMunicate:OPSE command is used to select which command to apply *OPC? to. Here, it is applied to the media access command.
Because *OPC? does not generate a response until the overlapping operation is completed, the file loading will have been completed by the time the response to *OPC? is read.

Note

Most commands are sequential commands. Overlap commands are indicated as such in chapter 5. All other commands are sequential commands.

Achieving Synchronization without Using Overlap Commands

Even when using sequential commands, there are times when it is necessary to achieve synchronization to properly query the measured data. For example, if you want to query the most recent numeric data each time that the measured data is updated, you can attempt to do this by sending the :NUMeric[:NORMal]:VALue? command with some arbitrary timing. However, because the WT1800 returns the current measured data regardless of whether the measured data has been updated since the previous query, this method may return data that is the same as the previous data. If this happens, you must use the following method to synchronize with the end of measured data updating.

- **Using the STATus:CONDition? query**
  STATus:CONDition? is used to query the contents of the condition register (see page 6-5 for details). You can determine whether the measured data is being updated by reading bit 0 of the condition register. If bit 0 of the condition register is 1, the measured data is being updated. If it is 0, the measured data can be queried.

- **Using the extended event register**
  The changes in the condition register can be reflected in the extended event register (see page 6-5 for details).

  Example
  ```
  :STATus:FILTer1 FALL;:STATus:EESE 1;EESR?;*SRE 8<PMT>
  (Read the response to STATus:EESR?)
  Loop
  (Wait for a service request)
  :NUMeric[:NORMal]:VALue?<PMT>
  (Read the response to :NUMeric[]NORMal]:VALue?)
  :STATus:EESR?<PMT>
  (Read the response to STATus:EESR?)
  (Return to Loop)
  ```

  The STATus:FILTer1 FALL command sets the transition filter so that bit 0 in the extended event (FILTer1) is set to 1 when bit 0 in the condition register changes from 1 to 0.
  The STATus:EESE 1 command is used to only change the status byte based on bit 0 in the extended event register.
  The STATus:EESR? command is used to clear the extended event register.
  The *SRE 8 command is used to generate service requests based only on the changes in the extended event register bits.
  The :NUMeric[:NORMal]:VALue? command is not executed until a service request is generated.

- **Using the COMMunicate:WAIT command**
  The COMMunicate:WAIT command is used to wait for a specific event to occur.

  Example
  ```
  ::STATus:FILTer1 FALL;:STATus:EESR?<PMT>
  (Read the response to STATus:EESR?)
  Loop
  COMMunicate:WAIT 1<PMT>
  :NUMeric[:NORMal]:VALue?<PMT>
  (Read the response to :NUMeric[]NORMal]:VALue?)
  :STATus:EESR?<PMT>
  (Read the response to STATus:EESR?)
  (Return to Loop)
  ```

  For a description of STATus:FILTer1 FALL and STATus:EESR?, see the previous section about the extended event register.
  The COMMunicate:WAIT 1 command specifies that the program will wait for bit 0 in the extended event register to be set to 1.
  :NUMeric[:NORMal]:VALue? is not executed until bit 0 in the extended event register becomes 1.

List of Commands

Command	Function	Page
AOUTput Group		
:AOUTput?	Queries all D/A output settings.	5-15
:AOUTput:NORMal?	Queries all D/A output settings.	5-15
:AOUTput[:NORMal]:CHANnel<x>	Sets or queries a D/A output item (function, element, or harmonic order).	5-15
:AOUTput[:NORMal]:IRTime	Sets or queries the integration time that is used in the D/A output of the integrated value.	5-15
:AOUTput[:NORMal]:MODE<x>	Sets or queries the rated-value setup mode for D/A output items.	5-15
:AOUTput[:NORMal]:RATE<x>	Sets or queries the rated maximum or minimum value for D/A output items.	5-15
AUX Group		
:AUX<x>?	Queries all auxiliary input settings.	5-16
:AUX<x>:AUTO	Sets or queries the voltage auto range on/off status of the specified auxiliary input.	5-16
:AUX<x>:FILTer?	Queries all input filter settings for the auxiliary inputs.	5-16
:AUX<x>:FILTer[:LINE]	Sets or queries the line filter for the auxiliary inputs.	5-16
:AUX<x>:LSCale?	Queries all auxiliary input linear scaling settings.	5-16
:AUX<x>:LSCale:AVALue	Sets or queries the slope (A) of the linear scale of the auxiliary input feature.	5-16
:AUX<x>:LSCale:BVALue	Sets or queries the offset (B) of the linear scale of the auxiliary input feature.	5-16
:AUX<x>:LSCale:CALCulate?	Queries all parameter calculation settings for the linear scale of the auxiliary input feature.	5-16
:AUX<x>:LSCale:CALCulate:{P1X|P1Y|P2X|P2Y}	Sets or queries the data (Point1X, Point1Y, Point2X, or Point2Y) for parameter calculations of the linear scale of the auxiliary input feature.	5-16
:AUX<x>:LSCale:CALCulate:EXECute	Calculates parameters for the linear scale of the auxiliary input feature.	5-17
:AUX<x>:NAME	Sets or queries the auxiliary input name.	5-17
:AUX<x>:RANGe	Sets or queries the auxiliary input voltage range.	5-17
:AUX<x>:SCALing	Sets or queries the auxiliary input scaling factor.	5-17
:AUX<x>:UNIT	Sets or queries the unit to assign to the auxiliary input.	5-17
COMMunicate Group		
:COMMunicate?	Queries all communication settings.	5-18
:COMMunicate:HEADer	Sets or queries whether a header is added to the response to a query. (Example with header: ":DISPLAY:MODE NUMERIC." Example without header: "NUMERIC.")	5-18
:COMMunicate:LOCKout	Sets or clears local lockout.	5-18
:COMMunicate:OPSE	Sets or queries the overlap command that is used by the *OPC, *OPC?, and *WAI commands.	5-18
:COMMunicate:OPSR?	Queries the operation pending status register.	5-18
:COMMunicate:OVERlap	Sets or queries the commands that operate as overlap commands.	5-18
:COMMunicate:REMote	Sets the WT1800 to remote or local mode. On is remote mode.	5-19
:COMMunicate:VERBose	Sets or queries whether the response to a query is returned fully spelled out (example: ":INPUT:VOLTAGE:RANGE:ELEMENT1 1.000E+03") or in its abbreviated form (example: "VOLT:RANG:ELEM 1.000E+03").	5-19
:COMMunicate:WAIT	Waits for a specified extended event to occur.	5-19
:COMMunicate:WAIT?	Creates the response that is returned when a specified extended event occurs.	5-19
CURSor Group		
:CURSor?	Queries all cursor measurement settings.	5-20
:CURSor:BAR?	Queries all bar graph display cursor measurement settings.	5-20
:CURSor:BAR:LINKage	Sets or queries the on/off status of the cursor position linkage on the bar graph display.	5-20
:CURSor:BAR:POSition<x>	Sets or queries the position of the specified cursor on the bar graph display.	5-20
:CURSor:BAR[:STATe]	Sets or queries the on/off status of the cursor display on the bar graph display.	5-20
:CURSor:BAR:{Y<x>|DY}?	Queries the measured value of the specified cursor on the bar graph display.	5-20

Command	Function	Page
:CURSor:TRENd?	Queries all trend display cursor measurement settings.	5-20
:CURSor:TRENd:LINKage	Sets or queries the on/off status of the cursor position linkage on the trend display.	5-20
:CURSor:TRENd:POSition<x>	Sets or queries the position of the specified cursor on the trend display.	5-20
:CURSor:TRENd[:STATe]	Sets or queries the on/off status of the cursor display on the trend display.	5-20
:CURSor:TRENd:TRACe<x>	Sets or queries the target of the specified cursor on the trend display.	5-21
:CURSor:TRENd:{X<x>|Y<x>|DY}?	Queries the measured value of the specified cursor on the trend display.	5-21
:CURSor:WAVE?	Queries all waveform display cursor measurement settings.	5-21
:CURSor:WAVE:LINKage	Sets or queries the on/off status of the cursor position linkage on the waveform display.	5-21
:CURSor:WAVE:PATH	Sets or queries the cursor path on the waveform display.	5-21
:CURSor:WAVE:POSition<x>	Sets or queries the position of the specified cursor on the waveform display.	5-21
:CURSor:WAVE[:STATe]	Sets or queries the on/off status of the cursor display on the waveform display.	5-21
:CURSor:WAVE:TRACe<x>	Sets or queries the target of the specified cursor on the waveform display.	5-21
:CURSor:WAVE:{X<x>|DX|PERDt|Y<x>|DY}?	Queries the measured value of the specified cursor on the waveform display.	5-21

DISPlay Group

:DISPlay?	Queries all display settings.	5-22
:DISPlay:BAR?	Queries all bar graph display settings.	5-22
:DISPlay:BAR:FORMat	Sets or queries the bar graph display format.	5-22
:DISPlay:BAR:ITEM<x>?	Queries all the display settings of the specified bar graph.	5-22
:DISPlay:BAR:ITEM<x>[:FUNCtion]	Sets or queries the function and element of the specified bar graph item.	5-22
:DISPlay:BAR:ITEM<x>:SCALing?	Queries all scaling settings for the specified bar graph.	5-22
:DISPlay:BAR:ITEM<x>:SCALing:MODE	Sets or queries the scaling mode of the specified bar graph.	5-22
:DISPlay:BAR:ITEM<x>:SCALing:VALue	Sets or queries the upper limit of the manual scaling of the specified bar graph.	5-22
:DISPlay:BAR:ITEM<x>:SCALing:VERTical	Sets or queries the vertical scaling mode of the specified bar graph.	5-23
:DISPlay:BAR:ITEM<x>:SCALing:XAXis	Sets or queries the position of the X axis of the specified bar graph.	5-23
:DISPlay:BAR:ORDer	Sets or queries the displayed starting and ending harmonic orders of the bar graphs.	5-23
:DISPlay:INFOrmation?	Queries all setup parameter list display settings.	5-23
:DISPlay:INFOrmation:PAGE	Sets or queries the displayed page of the setup parameter list display.	5-23
:DISPlay:INFOrmation[:STATe]	Sets or queries the on/off status of the setup parameter list display.	5-23
:DISPlay:MODE	Sets or queries the display mode.	5-23
:DISPlay:NUMeric?	Queries all numeric display settings.	5-24
:DISPlay:NUMeric:CUSTom?	Queries all numeric display settings in custom display mode.	5-24
:DISPlay:NUMeric:CUSTom:FILE:CDIRectory	Changes the directory that files are loaded from or saved to for the numeric display in custom display mode.	5-24
:DISPlay:NUMeric:CUSTom:FILE:DRIVe	Sets the drive that files are loaded from or saved to for the numeric display in custom display mode.	5-24
:DISPlay:NUMeric:CUSTom:FILE:FREE?	Queries the amount of free space (in bytes) on the drive that files are loaded from or saved to for the numeric display in custom display mode.	5-24
:DISPlay:NUMeric:CUSTom:FILE:LOAD:ABORt	Aborts a file loading operation for the numeric display in custom display mode.	5-24
:DISPlay:NUMeric:CUSTom:FILE:LOAD:BMP	Loads the specified background file for the numeric display in custom display mode.	5-24
:DISPlay:NUMeric:CUSTom:FILE:LOAD:BOTH	Loads the specified display configuration and background files for the numeric display in custom display mode.	5-24
:DISPlay:NUMeric:CUSTom:FILE:LOAD:ITEM	Loads the specified display configuration file for the numeric display in custom display mode.	5-24
:DISPlay:NUMeric:CUSTom:FILE:PATH?	Queries the absolute path of the directory that files are loaded from or saved to for the numeric display in custom display mode.	5-24
:DISPlay:NUMeric:CUSTom:FILE:SAVE:ANAMing	Sets or queries the automatic file name generation feature for saving display configuration files of the numeric display in custom display mode.	5-25

Command	Function	Page
:DISPlay:NUMeric:CUSTom:FILE:SAVE:ITEM	Saves the specified display configuration file for the numeric display in custom display mode.	5-25
:DISPlay:NUMeric:CUSTom:ITEM<x>?	Queries all the settings of the specified display item of the numeric display in custom display mode.	5-25
:DISPlay:NUMeric:CUSTom:ITEM<x>:COLor	Sets or queries the font color of the specified display item of the numeric display in custom display mode.	5-25
:DISPlay:NUMeric:CUSTom:ITEM<x>[:FUNCtion]	Sets or queries the display item (numeric item or string) of the numeric display in custom display mode.	5-26
:DISPlay:NUMeric:CUSTom:ITEM<x>:POSition	Sets or queries the display position of the specified display item of the numeric display in custom display mode.	5-26
:DISPlay:NUMeric:CUSTom:ITEM<x>:SIZE	Sets or queries the font size of the specified display item of the numeric display in custom display mode.	5-26
:DISPlay:NUMeric:CUSTom:PAGE	Sets or queries the displayed page of the numeric display in custom display mode.	5-26
:DISPlay:NUMeric:CUSTom:PERPage	Sets or queries the number of items displayed per page of the numeric display in custom display mode.	5-27
:DISPlay:NUMeric:CUSTom:TOTal	Sets or queries the total number of display items of the numeric display in custom display mode.	5-27
:DISPlay:NUMeric:FRAMe	Sets or queries the on/off status of the numeric display's data section frame.	5-27
:DISPlay:NUMeric:NORMal?	Queries all numeric display settings.	5-27
:DISPlay:NUMeric[:NORMal]:ALL?	Queries all settings of the numeric display in All Items display mode.	5-27
:DISPlay:NUMeric[:NORMal]:ALL:COLumn?	Queries all column settings of the numeric display in All Items display mode.	5-27
:DISPlay:NUMeric[:NORMal]:ALL:COLumn:DAELem	Sets or queries the on/off status of the column display all feature of the numeric display in All Items display mode.	5-27
:DISPlay:NUMeric[:NORMal]:ALL:COLumn:SCRoll	Sets or queries the on/off status of column scrolling of the numeric display in All Items display mode.	5-27
:DISPlay:NUMeric[:NORMal]:ALL:CURSor	Sets or queries the cursor position on the numeric display in All Items display mode.	5-28
:DISPlay:NUMeric[:NORMal]:ALL:ORDer	Sets or queries the displayed harmonic order on the harmonic measurement function display page of the numeric display in All Items display mode.	5-28
:DISPlay:NUMeric[:NORMal]:ALL:PAGE	Sets or queries the displayed page of the numeric display in All Items display mode.	5-28
:DISPlay:NUMeric[:NORMal]:FORMat	Sets or queries the numeric display format.	5-28
:DISPlay:NUMeric[:NORMal]:LIST?	Queries all numeric display settings in the list display modes.	5-28
:DISPlay:NUMeric[:NORMal]:LIST:CURSor	Sets or queries the cursor position on the numeric display in the list display modes.	5-28
:DISPlay:NUMeric[:NORMal]:LIST:HEADer	Sets or queries the cursor position of the header section on the numeric display in the list display modes.	5-29
:DISPlay:NUMeric[:NORMal]:LIST:ITEM<x>	Sets or queries the specified display item (function and element) on the numeric display in the list display modes.	5-29
:DISPlay:NUMeric[:NORMal]:LIST:ORDer	Sets or queries the harmonic order cursor position of the data section on the numeric display in the list display modes.	5-29
:DISPlay:NUMeric[:NORMal]:MATRix?	Queries all numeric display settings in matrix display mode.	5-29
:DISPlay:NUMeric[:NORMal]:MATRix:COLumn?	Queries all column settings of the numeric display in matrix display mode.	5-29
:DISPlay:NUMeric[:NORMal]:MATRix:COLumn:ITEM<x>	Sets or queries the specified column display item of the numeric display in matrix display mode.	5-29
:DISPlay:NUMeric[:NORMal]:MATRix:COLumn:NUMber	Sets or queries the number of columns of the numeric display in matrix display mode.	5-30
:DISPlay:NUMeric[:NORMal]:MATRix:COLumn:RESet	Resets the column display items to their default values on the numeric display in matrix display mode.	5-30
:DISPlay:NUMeric[:NORMal]:MATRix:CURSor	Sets or queries the cursor position on the numeric display in matrix display mode.	5-30
:DISPlay:NUMeric[:NORMal]:MATRix:ITEM<x>	Sets or queries the specified display item (function and harmonic order) on the numeric display in matrix display mode.	5-30
:DISPlay:NUMeric[:NORMal]:MATRix:PAGE	Sets or queries the displayed page of the numeric display in matrix display mode.	5-30
:DISPlay:NUMeric[:NORMal]:MATRix:PRESet	Presets the display order pattern of displayed items on the numeric display in matrix display mode.	5-31

Command	Function	Page
:DISPlay:NUMeric[:NORMal]:{VAL4|VAL8|VAL16}?	Queries all numeric display settings in 4 Items, 8 Items, or 16 Items display mode.	5-31
:DISPlay:NUMeric[:NORMal]:{VAL4|VAL8|VAL16}:CURSor	Sets or queries the cursor position on the numeric display in 4 Items, 8 Items, or 16 Items display mode.	5-31
:DISPlay:NUMeric[:NORMal]:{VAL4|VAL8|VAL16}:ITEM<x>	Sets or queries the function, element, and harmonic order of the specified numeric display item in 4 Items, 8 Items, or 16 Items display mode.	5-31
:DISPlay:NUMeric[:NORMal]:{VAL4|VAL8|VAL16}:PAGE	Sets or queries the displayed page of the numeric display in 4 Items, 8 Items, or 16 Items display mode.	5-32
:DISPlay:NUMeric[:NORMal]:{VAL4|VAL8|VAL16}:PRESet	Presets the display order pattern of displayed items on the numeric display in 4 Items, 8 Items, or 16 Items display mode.	5-32
:DISPlay:TRENd?	Queries all trend display settings.	5-32
:DISPlay:TRENd:ALL	Collectively sets the on/off status of all trends.	5-32
:DISPlay:TRENd:CLEar	Clears all trends.	5-32
:DISPlay:TRENd:FORMat	Sets or queries the display format of all trends.	5-32
:DISPlay:TRENd:ITEM<x>?	Queries all settings for the specified trend.	5-32
:DISPlay:TRENd:ITEM<x>[:FUNCtion]	Sets or queries the function, element, and harmonic order of the specified trend item.	5-32
:DISPlay:TRENd:ITEM<x>:SCALing?	Queries all scaling settings for the specified trend.	5-33
:DISPlay:TRENd:ITEM<x>:SCALing:MODE	Sets or queries the scaling mode of the specified trend.	5-33
:DISPlay:TRENd:ITEM<x>:SCALing:VALue	Sets or queries the upper and lower limits of the manual scaling of the specified trend.	5-33
:DISPlay:TRENd:T<x>	Sets or queries the on/off status of the specified trend.	5-33
:DISPlay:TRENd:TDIV	Sets or queries the trend horizontal axis (T/div).	5-33
:DISPlay:VECTor?	Queries all vector display settings.	5-33
:DISPlay:VECTor:FORMat	Sets or queries the display format of all vectors.	5-33
:DISPlay:VECTor:ITEM<x>?	Queries all settings for the specified vector.	5-33
:DISPlay:VECTor:ITEM<x>:OBJect	Sets or queries the wiring unit that is displayed using the specified vector.	5-33
:DISPlay:VECTor:ITEM<x>:{UMAG|IMAG}	Sets or queries the voltage or current zoom factor for the vector display.	5-34
:DISPlay:VECTor:NUMeric	Sets or queries the on/off status of the numeric data display on the vector display.	5-34
:DISPlay:WAVE?	Queries all waveform display settings.	5-34
:DISPlay:WAVE:ALL	Collectively sets the on/off status of all waveform displays.	5-34
:DISPlay:WAVE:FORMat	Sets or queries the display format of all waveforms.	5-34
:DISPlay:WAVE:GRATicule	Sets or queries the graticule (grid) type.	5-34
:DISPlay:WAVE:INTerpolate	Sets or queries the waveform interpolation method.	5-34
:DISPlay:WAVE:MAPPing?	Queries all split screen waveform mapping settings.	5-34
:DISPlay:WAVE:MAPPing[:MODE]	Sets or queries the split screen waveform mapping mode.	5-34
:DISPlay:WAVE:MAPPing:{U<x>|I<x>|SPEed|TORQue|AUX<x>}	Sets or queries the split screen voltage, current, rotating speed, torque, or auxiliary signal waveform mapping setting.	5-34
:DISPlay:WAVE:POSition?	Queries all waveform vertical position (center position level) settings.	5-34
:DISPlay:WAVE:POSition:{U<x>|I<x>}	Sets or queries the vertical position (center position level) of the specified element's voltage or current waveform.	5-35
:DISPlay:WAVE:POSition:{UALL|IALL}	Collectively sets the vertical positions (center position levels) of the voltage or current waveforms of all elements.	5-35
:DISPlay:WAVE:SVALue	Sets or queries the on/off status of the scale value display.	5-35
:DISPlay:WAVE:TDIV	Sets or queries the waveform Time/div value.	5-35
:DISPlay:WAVE:TLABel	Sets or queries the on/off status of the waveform labels.	5-35
:DISPlay:WAVE:TRIGger?	Queries all trigger settings.	5-35
:DISPlay:WAVE:TRIGger:LEVel	Sets or queries the trigger level.	5-35
:DISPlay:WAVE:TRIGger:MODE	Sets or queries the trigger mode.	5-35
:DISPlay:WAVE:TRIGger:SLOPe	Sets or queries the trigger slope.	5-35
:DISPlay:WAVE:TRIGger:SOURce	Sets or queries the trigger source.	5-35
:DISPlay:WAVE:{U<x>|I<x>|SPEed|TORQue|AUX<x>}	Sets or queries the on/off status of the voltage, current, rotating speed, torque, or auxiliary signal waveform display.	5-36
:DISPlay:WAVE:VZoom?	Queries all waveform vertical zoom factor settings.	5-36
:DISPlay:WAVE:VZoom:{U<x>|I<x>}	Sets or queries the vertical zoom factor of the specified element's voltage or current waveform.	5-36
:DISPlay:WAVE:VZoom:{UALL|IALL}	Collectively sets the vertical zoom factor for the voltage or current waveforms of all elements.	5-36

Command	Function	Page
FILE Group		
:FILE?	Queries all file operation settings.	5-41
:FILE:CDIRectory	Changes the current directory.	5-41
:FILE:DELete:IMAGe:{BMP|PNG|JPEG}	Deletes the specified screen image data file.	5-41
:FILE:DELete:NUMeric:ASCii	Deletes the specified numeric data file.	5-41
:FILE:DELete:SETup	Deletes the specified setup parameter file.	5-41
:FILE:DELete:STORe:{DATA|HEADer}	Deletes the specified stored numeric data file.	5-41
:FILE:DELete:WAVE:ASCii	Deletes the specified waveform display data file.	5-41
:FILE:DRIVe	Sets the current drive.	5-41
:FILE:FILTer	Sets or queries the file list filter.	5-41
:FILE:FREE?	Queries the free space (in bytes) on the current drive.	5-41
:FILE:LOAD:ABORt	Aborts a file loading operation.	5-41
:FILE:LOAD:SETup	Loads the specified setup parameter file.	5-41
:FILE:PATH?	Queries the absolute path of the current directory.	5-41
:FILE:SAVE?	Queries all file save settings.	5-42
:FILE:SAVE:ABORt	Aborts a file saving operation.	5-42
:FILE:SAVE:ANAMing	Sets or queries the auto naming feature for saving files.	5-42
:FILE:SAVE:COMMent	Sets or queries the comment that will be added to files that are saved.	5-42
:FILE:SAVE:NUMeric[:EXECute]	Saves numeric data to a file.	5-42
:FILE:SAVE:NUMeric:ITEM	Sets or queries the method that is used to select which items are saved when numeric data is saved to a file.	5-42
:FILE:SAVE:NUMeric:NORMal?	Queries all numeric data file save settings (for the manual save item selection method).	5-42
:FILE:SAVE:NUMeric:NORMal:ALL	Collectively sets the on/off status of the output of all element functions when numeric data is saved to a file.	5-42
:FILE:SAVE:NUMeric:NORMal:{ELEMent<x>|SIGMA|SIGMB|SIGMC}	Sets or queries the on/off status of the output of the specified element or wiring unit ΣA, ΣB, or ΣC when numeric data is saved to a file.	5-42
:FILE:SAVE:NUMeric:NORMal:<Function>	Sets or queries the on/off status of the specified function's output when numeric data is saved to a file.	5-42
:FILE:SAVE:NUMeric:NORMal:PRESet<x>	Presets the output on/off pattern of the element functions to be used when numeric data is saved to a file.	5-43
:FILE:SAVE:SETup[:EXECute]	Saves setup parameters to a file.	5-43
:FILE:SAVE:WAVE[:EXECute]	Saves waveform display data to a file.	5-43
HARMonics Group		
:HARMonics<x>?	Queries all harmonic measurement settings.	5-44
:HARMonics<x>:CONFigure?	Queries the harmonic measurement groups of all elements.	5-44
:HARMonics<x>:CONFigure[:ALL]	Collectively sets the harmonic measurement group of all elements.	5-44
:HARMonics<x>:CONFigure:ELEMent<x>	Sets or queries the harmonic measurement group of the specified element.	5-44
:HARMonics<x>:CONFigure:{SIGMA|SIGMB|SIGMC}	Collectively sets the harmonic measurement group of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).	5-44
:HARMonics<x>:ORDer	Sets or queries the maximum and minimum harmonic orders that are analyzed.	5-44
:HARMonics<x>:PLLSource	Sets or queries the PLL source.	5-44
:HARMonics<x>:THD	Sets or queries the equation used to compute the THD (total harmonic distortion).	5-44
HCOPy Group		
:HCOPy?	Queries all print settings.	5-45
:HCOPy:ABORt	Aborts a print operation.	5-45
:HCOPy:AUTO?	Queries all auto print settings.	5-45
:HCOPy:AUTO:COUNt	Sets or queries the auto print count.	5-45
:HCOPy:AUTO:INTerval	Sets or queries the auto print interval.	5-45
:HCOPy:AUTO:MODE	Sets or queries the auto print operation mode.	5-45
:HCOPy:AUTO:PASTart	Sets or queries whether printing starts when auto printing starts.	5-45
:HCOPy:AUTO:{STARt|END}	Sets or queries the printing start or end time for real-time printing mode.	5-45
:HCOPy:AUTO[:STATe]	Sets or queries the auto print feature's on/off status.	5-46

Command	Function	Page
:HCOPy:AUTO:TEVent	Sets or queries the event that the event-synchronized print mode will trigger on.	5-46
:HCOPy:COMMent	Sets or queries the comment displayed at the bottom of the screen.	5-46
:HCOPy:EXECute	Executes a print operation.	5-46
:HCOPy:PRINter?	Queries all print settings for the built-in printer.	5-46
:HCOPy:PRINter:FEED	Executes a paper feed on the built-in printer.	5-46
:HCOPy:PRINter:FORMat	Sets or queries the contents that will be printed from the built-in printer.	5-46

HOLD Group

:HOLD	Sets or queries the on/off status of the output hold feature for display, communication, and other types of data.	5-47

IMAGe Group

:IMAGe?	Queries all screen image data output settings.	5-48
:IMAGe:ABORt	Aborts a screen image data output operation.	5-48
:IMAGe:COLor	Sets or queries the color tone of the screen image data that will be saved.	5-48
:IMAGe:COMMent	Sets or queries the comment displayed at the bottom of the screen.	5-48
:IMAGe:EXECute	Executes a screen image data output operation.	5-48
:IMAGe:FORMat	Sets or queries the format of the screen image data that will be saved.	5-48
:IMAGe:SAVE?	Queries all screen image data save settings.	5-48
:IMAGe:SAVE:ANAMing	Sets or queries the auto naming feature for saving files.	5-48
:IMAGe:SAVE:CDIRectory	Changes the directory that screen image data is saved to.	5-48
:IMAGe:SAVE:DRIVe	Sets the drive that screen image data is saved to.	5-48
:IMAGe:SAVE:FREE?	Queries the free space (in bytes) on the drive that the screen image data is saved to.	5-48
:IMAGe:SAVE:NAME	Sets or queries the name of the file that will be saved.	5-49
:IMAGe:SAVE:PATH?	Queries the absolute path of the directory that the screen image data is saved to.	5-49
:IMAGe:SEND?	Queries the screen image data.	5-49

INPut Group

:INPut?	Queries all input element settings.	5-50
[:INPut]:CFACtor	Sets or queries the crest factor.	5-50
[:INPut]:CURRent?	Queries all electric current measurement settings.	5-50
[:INPut]:CURRent:AUTO?	Queries the electric current auto range on/off statuses of all elements.	5-50
[:INPut]:CURRent:AUTO[:ALL]	Collectively sets the electric current auto range on/off status of all elements.	5-50
[:INPut]:CURRent:AUTO:ELEMent<x>	Sets or queries the electric current auto range on/off status of the specified element.	5-50
[:INPut]:CURRent:AUTO:{SIGMA|SIGMB|SIGMC}	Collectively sets the electric current auto range on/off status of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).	5-50
[:INPut]:CURRent:CONFig?	Queries the valid electric current ranges of all elements.	5-50
[:INPut]:CURRent:CONFig[:ALL]	Collectively sets the valid electric current range of all elements.	5-50
[:INPut]:CURRent:CONFig:ELEMent<x>	Sets or queries the valid electric current range of the specified element.	5-51
[:INPut]:CURRent:EXTSensor?	Queries all external current sensor range settings.	5-51
[:INPut]:CURRent:EXTSensor:CONFig?	Queries the valid external current sensor ranges of all elements.	5-51
[:INPut]:CURRent:EXTSensor:CONFig[:ALL]	Collectively sets the valid external current sensor range of all elements.	5-51
[:INPut]:CURRent:EXTSensor:CONFig:ELEMent<x>	Sets or queries the valid external current sensor ranges of the specified element.	5-51
[:INPut]:CURRent:EXTSensor:DISPlay	Sets or queries the display mode of the external current sensor range.	5-51
[:INPut]:CURRent:EXTSensor:POJump?	Queries the jump destination ranges of all elements that are used when a current peak over-range occurs.	5-51
[:INPut]:CURRent:EXTSensor:POJump[:ALL]	Collectively sets the jump destination range of all elements that is used when a current peak over-range occurs.	5-52
[:INPut]:CURRent:EXTSensor:POJump:ELEMent<x>	Sets or queries the jump destination range of the specified element that is used when a current peak over-range occurs.	5-52

Command	Function	Page
[:INPut]:CURRent:POJump?	Queries the jump destination ranges of all elements that are used when a current peak over-range occurs.	5-52
[:INPut]:CURRent:POJump[:ALL]	Collectively sets the jump destination range of all elements that is used when a current peak over-range occurs.	5-52
[:INPut]:CURRent:POJump:ELEMent<x>	Sets or queries the jump destination range of the specified element that is used when a current peak over-range occurs.	5-52
[:INPut]:CURRent:RANGe?	Queries the electric current ranges of all elements.	5-52
[:INPut]:CURRent:RANGe[:ALL]	Collectively sets the electric current range of all elements.	5-53
[:INPut]:CURRent:RANGe:ELEMent<x>	Sets or queries the electric current range of the specified element.	5-53
[:INPut]:CURRent:RANGe:{SIGMA|SIGMB|SIGMC}	Collectively sets the electric current range of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).	5-53
[:INPut]:CURRent:SRATio?	Queries the external current sensor conversion ratios of all elements.	5-53
[:INPut]:CURRent:SRATio[:ALL]	Collectively sets the external current sensor conversion ratios of all elements.	5-53
[:INPut]:CURRent:SRATio:ELEMent<x>	Sets or queries the external current sensor conversion ratio of the specified element.	5-53
[:INPut]:CURRent:SRATio:{SIGMA|SIGMB|SIGMC}	Collectively sets the external current sensor conversion ratios of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).	5-54
[:INPut]:ESELect	Sets or queries the element whose measurement range will be set.	5-54
[:INPut]:FILTer?	Queries all input filter settings.	5-54
[:INPut]:FILTer:FREQuency?	Queries the frequency filters of all elements.	5-54
[:INPut]:FILTer:FREQuency[:ALL]	Collectively sets the frequency filter of all elements.	5-54
[:INPut]:FILTer:FREQuency:ELEMent<x>	Sets or queries the frequency filter of the specified element.	5-54
[:INPut]:FILTer:LINE?	Queries the line filters of all elements.	5-54
[:INPut]:FILTer[:LINE][:ALL]	Collectively sets the line filter of all elements.	5-54
[:INPut]:FILTer[:LINE]:ELEMent<x>	Sets or queries the line filter of the specified element.	5-54
[:INPut]:FILTer[:LINE]:{SIGMA|SIGMB|SIGMC}	Collectively sets the line filter of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).	5-55
[:INPut]:INDependent	Sets or queries the on/off status of independent input element configuration.	5-55
[:INPut]:MODUle?	Queries the input element type.	5-55
[:INPut]:NULL:CONDition:{SPEed|TORQue|AUX<x>}	Queries the status of the NULL operation of rotating speed, torque, or AUX.	5-55
[:INPut]:NULL:CONDition:{U<x>|I<x>}	Queries the status of the voltage or current NULL operation of the specified element.	5-55
[:INPut]:NULL[:STATe]	Sets or queries the on/off status of the NULL feature.	5-55
[:INPut]:NULL:TARGet?	Queries all settings for the target of the NULL feature.	5-55
[:INPut]:NULL:TARGet[:MODE]	Sets or queries the selection mode for the target of the NULL feature.	5-55
[:INPut]:NULL:TARGet:{SPEed|TORQue|AUX<x>}	Sets or queries the target of the NULL operation (rotating speed, torque, or AUX).	5-55
[:INPut]:NULL:TARGet:{U<x>|I<x>}	Sets or queries the target of the voltage or current NULL operation of the specified element.	5-56
[:INPut]:NULL:TARGet:{UALL|IALL}	Collectively sets the target of the voltage or current NULL operation of all elements.	5-56
[:INPut]:POVer?	Queries the peak over-range information.	5-56
[:INPut]:SCALing?	Queries all scaling settings.	5-56
[:INPut]:SCALing:STATe?	Queries the on/off statuses of the scaling of all elements.	5-56
[:INPut]:SCALing[:STATe][:ALL]	Collectively sets the on/off status of the scaling of all elements.	5-56
[:INPut]:SCALing[:STATe]:ELEMent<x>	Sets or queries the on/off status of the scaling of the specified element.	5-56
[:INPut]:SCALing:{VT|CT|SFACtor}?	Queries the VT ratios, CT ratios, or power coefficients of all elements.	5-56
[:INPut]:SCALing:{VT|CT|SFACtor}[:ALL]	Collectively sets the VT ratio, CT ratio, or power coefficient of all elements.	5-56
[:INPut]:SCALing:{VT|CT|SFACtor}:ELEMent<x>	Sets or queries the VT ratio, CT ratio, or power coefficient of the specified element.	5-56
[:INPut]:SCALing:{VT|CT|SFACtor}:{SIGMA|SIGMB|SIGMC}	Collectively sets the VT ratio, CT ratio, or power coefficient of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).	5-57
[:INPut]:SYNChronize?	Queries the synchronization sources of all elements.	5-57

Command	Function	Page
[:INPut]:SYNChronize[:ALL]	Collectively sets the synchronization source of all elements.	5-57
[:INPut]:SYNChronize:ELEMent<x>	Sets or queries the synchronization source of the specified element.	5-57
[:INPut]:SYNChronize:{SIGMA|SIGMB|SIGMC}	Collectively sets the synchronization source of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).	5-57
[:INPut]:VOLTage?	Queries all voltage measurement settings.	5-57
[:INPut]:VOLTage:AUTO?	Queries the voltage auto range on/off statuses of all elements.	5-57
[:INPut]:VOLTage:AUTO[:ALL]	Collectively sets the voltage auto range on/off status of all elements.	5-57
[:INPut]:VOLTage:AUTO:ELEMent<x>	Sets or queries the voltage auto range on/off status of the specified element.	5-57
[:INPut]:VOLTage:AUTO:{SIGMA|SIGMB|SIGMC}	Collectively sets the voltage auto range on/off status of all elements.	5-57
[:INPut]:VOLTage:CONFig?	Queries the valid voltage ranges of all elements.	5-57
[:INPut]:VOLTage:CONFig[:ALL]	Collectively sets the valid voltage range of all elements.	5-58
[:INPut]:VOLTage:CONFig:ELEMent<x>	Sets or queries the valid voltage ranges of the specified element.	5-58
[:INPut]:VOLTage:POJump?	Queries the jump destination ranges of all elements that are used when a voltage peak over-range occurs.	5-58
[:INPut]:VOLTage:POJump[:ALL]	Collectively sets the jump destination range of all elements that is used when a voltage peak over-range occurs.	5-58
[:INPut]:VOLTage:POJump:ELEMent<x>	Sets or queries the jump destination range of the specified element that is used when a voltage peak over-range occurs.	5-58
[:INPut]:VOLTage:RANGe?	Queries the voltage ranges of all elements.	5-58
[:INPut]:VOLTage:RANGe[:ALL]	Collectively sets the voltage range of all elements.	5-58
[:INPut]:VOLTage:RANGe:ELEMent<x>	Sets or queries the voltage range of the specified element.	5-59
[:INPut]:VOLTage:RANGe:{SIGMA|SIGMB|SIGMC}	Collectively sets the voltage range of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).	5-59
[:INPut]:WIRing	Sets or queries the wiring system.	5-59

INTEGrate Group

:INTEGrate?	Queries all integration settings.	5-60
:INTEGrate:ACAL	Sets or queries the on/off status of integration auto calibration.	5-60
:INTEGrate:INDependent	Sets or queries the on/off status of independent element integration.	5-60
:INTEGrate:MODE	Sets or queries the integration mode.	5-60
:INTEGrate:QMODe?	Queries the electric current modes for electric current integration of all elements.	5-60
:INTEGrate:QMODe[:ALL]	Collectively sets the electric current mode for electric current integration of all elements.	5-60
:INTEGrate:QMODe:ELEMent<x>	Sets or queries the electric current mode for electric current integration of the specified element.	5-60
:INTEGrate:RESet	Resets the integrated value.	5-60
:INTEGrate:RTALl:{STARt|END}	Collectively sets the integration start or end time of all elements for real-time integration mode.	5-60
:INTEGrate:RTIMe<x>?	Queries the integration start and end times for real-time integration mode.	5-61
:INTEGrate:RTIMe<x>:{STARt|END}	Sets or queries the integration start or end time for real-time integration mode.	5-61
:INTEGrate:STARt	Starts integration.	5-61
:INTEGrate:STATe?	Queries the integration status.	5-61
:INTEGrate:STOP	Stops integration.	5-62
:INTEGrate:TIMer<x>	Sets or queries the integration timer value.	5-62
:INTEGrate:TMALl	Collectively sets the integration timer of all elements.	5-62
:INTEGrate:WPTYpe?	Queries the watt-hour integration methods for each polarity (WP+/WP–) of all elements.	5-62
:INTEGrate:WPTYpe[:ALL]	Collectively sets the watt-hour integration method for each polarity (WP+/WP–) of all elements.	5-62
:INTEGrate:WPTYpe:ELEMent<x>	Sets or queries the watt-hour integration method for each polarity (WP+/WP–) of the specified element.	5-62

MEASure Group

Command	Function	Page
:MEASure?	Queries all computation settings.	5-63
:MEASure:AVERaging?	Queries all averaging settings.	5-63
:MEASure:AVERaging:COUNt	Sets or queries the averaging coefficient.	5-63
:MEASure:AVERaging[:STATe]	Sets or queries the on/off status of averaging.	5-63
:MEASure:AVERaging:TYPE	Sets or queries the averaging type.	5-63
:MEASure:DMeasure?	Queries all delta computation settings.	5-63
:MEASure:DMeasure:MODE	Sets or queries the voltage or current mode that is used in delta computation.	5-63
:MEASure:DMeasure:{SIGMA|SIGMB|SIGMC}	Sets or queries the delta computation mode for wiring unit ΣA, ΣB, or ΣC.	5-63
:MEASure:EFFiciency?	Queries all efficiency computation settings.	5-64
:MEASure:EFFiciency:ETA<x>	Sets or queries the efficiency equation.	5-64
:MEASure:EFFiciency:UDEF<x>	Sets or queries the user-defined parameters used in the efficiency equation.	5-64
:MEASure:EVENt<x>?	Queries all the settings of the specified user-defined event.	5-64
:MEASure:EVENt<x>:EXPRession?	Queries all the settings of the specified user-defined event's expression.	5-64
:MEASure:EVENt<x>:EXPRession:CONDition	Sets or queries the specified user-defined event's expression (compound condition type).	5-64
:MEASure:EVENt<x>:EXPRession:INVerse	Sets or queries the on/off status of the logic inversion of the specified user-defined event's expression (compound condition type).	5-64
:MEASure:EVENt<x>:EXPRession:ITEM	Sets or queries the target item of the specified user-defined event's expression (range-defined type).	5-65
:MEASure:EVENt<x>:EXPRession:LIMit<x>	Sets or queries the range of the specified user-defined event's expression (range-defined type).	5-65
:MEASure:EVENt<x>:EXPRession:STRing?	Queries the specified user-defined event's expression as a string.	5-65
:MEASure:EVENt<x>:EXPRession:TYPE	Sets or queries the specified user-defined event's expression type.	5-65
:MEASure:EVENt<x>:FLABel	Sets or queries the string that is displayed when the specified user-defined event's condition is not met.	5-65
:MEASure:EVENt<x>:NAME	Sets or queries the specified user-defined event's name.	5-65
:MEASure:EVENt<x>[:STATe]	Sets or queries the on/off status of the specified user-defined event.	5-65
:MEASure:EVENt<x>:TLABel	Sets or queries the string that is displayed when the specified user-defined event's condition is met.	5-66
:MEASure:FREQuency?	Queries all frequency measurement settings.	5-66
:MEASure:FREQuency:ITEM<x>	Sets or queries the element whose frequency will be measured.	5-66
:MEASure:FUNCtion<x>?	Queries all the settings of the specified user-defined function.	5-66
:MEASure:FUNCtion<x>:EXPRession	Sets or queries the equation of the specified user-defined function.	5-66
:MEASure:FUNCtion<x>:NAME	Sets or queries the name of the specified user-defined function.	5-66
:MEASure:FUNCtion<x>[:STATe]	Sets or queries the on/off status of the specified user-defined function.	5-66
:MEASure:FUNCtion<x>:UNIT	Sets or queries the unit that is added to the computation result of the specified user-defined function.	5-66
:MEASure:MHOLd	Sets or queries the on/off status of the MAX HOLD feature used in user-defined functions.	5-66
:MEASure:PC?	Queries all Pc (Corrected Power) computation settings.	5-67
:MEASure:PC:IEC	Sets or queries the Pc (Corrected Power) equation.	5-67
:MEASure:PC:P<x>	Sets or queries a Pc (Corrected Power) equation parameter.	5-67
:MEASure:PHASe	Sets or queries the display format of the phase difference.	5-67
:MEASure:SAMPling	Sets or queries the sampling frequency.	5-67
:MEASure:SFORmula	Sets or queries the equation used to compute S (apparent power).	5-67
:MEASure:SQFormula	Sets or queries the equation used to compute S (apparent power) and Q (reactive power).	5-67
:MEASure:SYNChronize	Sets or queries the synchronized measurement mode.	5-67

Command	Function	Page
MOTor Group		
:MOTor?	Queries all motor evaluation function settings.	5-68
:MOTor:EANGle?	Queries all electrical angle measurement settings.	5-68
:MOTor:EANGle:CORRection?	Queries all electrical angle correction settings.	5-68
:MOTor:EANGle:CORRection:AENTer?	Queries all automatic electrical angle correction entry settings.	5-68
:MOTor:EANGle:CORRection:AENTer[:EXECute]	Executes an automatic electrical angle correction entry.	5-68
:MOTor:EANGle:CORRection:AENTer:TARGet	Sets or queries the target source for automatically entering the electrical angle correction value.	5-68
:MOTor:EANGle:CORRection:CLEar	Clears the electrical angle correction value.	5-68
:MOTor:EANGle:CORRection[:VALue]	Sets or queries the electrical angle correction value.	5-68
:MOTor:EANGle[:STATe]	Sets or queries the on/off status of electrical angle measurement.	5-68
:MOTor:FILTer?	Queries all input filter settings.	5-68
:MOTor:FILTer[:LINE]	Sets or queries the line filter.	5-68
:MOTor:PM?	Queries all motor output (Pm) settings.	5-68
:MOTor:PM:SCALing	Sets or queries the motor output computation scaling factor.	5-69
:MOTor:PM:UNIT	Sets or queries the unit that is added to the motor output computation result.	5-69
:MOTor:POLE	Sets or queries the motor's number of poles.	5-69
:MOTor:SPEed?	Queries all rotating speed (Speed) settings.	5-69
:MOTor:SPEed:AUTO	Sets or queries the voltage auto range on/off status of the revolution signal (analog input type).	5-69
:MOTor:SPEed:LSCale?	Queries all revolution signal (analog input type) linear scaling settings.	5-69
:MOTor:SPEed:LSCale:AVALue	Sets or queries the slope (A) of the linear scale of the revolution signal (analog input type).	5-69
:MOTor:SPEed:LSCale:BVALue	Sets or queries the offset (B) of the linear scale of the revolution signal (analog input type).	5-69
:MOTor:SPEed:LSCale:CALCulate?	Queries all parameter calculation settings for the linear scale of the revolution signal (analog input type).	5-69
:MOTor:SPEed:LSCale:CALCulate:{P1X|P1Y|P2X|P2Y}	Sets or queries the data (Point1X, Point1Y, Point2X, or Point2Y) for parameter calculations of the linear scale of the revolution signal (analog input type).	5-69
:MOTor:SPEed:LSCale:CALCulate:EXECute	Calculates parameters for the linear scale of the revolution signal (analog input type).	5-69
:MOTor:SPEed:PRANge	Sets or queries the range of the revolution signal (pulse input type).	5-70
:MOTor:SPEed:PULSe	Sets or queries the number of pulses of the revolution signal (pulse input type).	5-70
:MOTor:SPEed:RANGe	Sets or queries the voltage range of the revolution signal (analog input type).	5-70
:MOTor:SPEed:SCALing	Sets or queries the rotating speed computation scaling factor.	5-70
:MOTor:SPEed:TYPE	Sets or queries the revolution signal input type.	5-70
:MOTor:SPEed:UNIT	Sets or queries the unit that is added to the rotating speed computation result.	5-70
:MOTor:SSPeed	Sets or queries the frequency measurement source for the synchronous speed (SyncSp) computation.	5-70
:MOTor:SYNChronize	Sets or queries the synchronization source for the rotating speed (Speed) and torque (Torque) computations.	5-70
:MOTor:TORQue?	Queries all torque (Torque) settings.	5-70
:MOTor:TORQue:AUTO	Sets or queries the voltage auto range on/off status of the torque signal (analog input type).	5-71
:MOTor:TORQue:LSCale?	Queries all torque signal (analog input type) linear scaling settings.	5-71
:MOTor:TORQue:LSCale:AVALue	Sets or queries the slope (A) of the linear scale of the torque signal (analog input type).	5-71
:MOTor:TORQue:LSCale:BVALue	Sets or queries the offset (B) of the linear scale of the torque signal (analog input type).	5-71
:MOTor:TORQue:LSCale:CALCulate?	Queries all parameter calculation settings for the linear scale of the torque signal (analog input type).	5-71
:MOTor:TORQue:LSCale:CALCulate:{P1X|P1Y|P2X|P2Y}	Sets or queries the data (Point1X, Point1Y, Point2X, or Point2Y) for parameter calculations of the linear scale of the torque signal (analog input type).	5-71
:MOTor:TORQue:LSCale:CALCulate:EXECute	Calculates parameters for the linear scale of the torque signal (analog input type).	5-71

Command	Function	Page
:MOTor:TORQue:PRANge	Sets or queries the range of the torque signal (pulse input type).	5-71
:MOTor:TORQue:RANGe	Sets or queries the voltage range of the torque signal (analog input type).	5-71
:MOTor:TORQue:RATE?	Queries all torque signal (pulse input type) rated-value settings.	5-72
:MOTor:TORQue:RATE:{UPPer|LOWer}	Sets or queries the upper or lower limit of the rated value of the torque signal (pulse input type).	5-72
:MOTor:TORQue:SCALing	Sets or queries the torque computation scaling factor.	5-72
:MOTor:TORQue:TYPE	Sets or queries the torque signal input type.	5-72
:MOTor:TORQue:UNIT	Sets or queries the unit that is added to the torque computation result.	5-72

NUMeric Group

:NUMeric?	Queries all numeric data output settings.	5-73
:NUMeric:FORMat	Sets or queries the numeric data format.	5-73
:NUMeric:HOLD	Sets or queries the on/off (hold/release) status of the numeric data hold feature.	5-73
:NUMeric:LIST?	Queries all harmonic measurement numeric list data output settings.	5-74
:NUMeric:LIST:CLEar	Clears harmonic measurement numeric list data output items (sets the items to NONE).	5-74
:NUMeric:LIST:DELete	Deletes harmonic measurement numeric list data output items.	5-74
:NUMeric:LIST:ITEM<x>	Sets or queries the output item (function and element) of the specified harmonic measurement numeric list data item.	5-74
:NUMeric:LIST:NUMber	Sets or queries the number of numeric list data items that are transmitted by :NUMeric:LIST:VALue?.	5-74
:NUMeric:LIST:ORDer	Sets or queries the maximum output harmonic order of the harmonic measurement numeric list data.	5-74
:NUMeric:LIST:PRESet	Presets the harmonic measurement numeric list data output item pattern.	5-75
:NUMeric:LIST:SELect	Sets or queries the output components of the harmonic measurement numeric list data.	5-75
:NUMeric:LIST:VALue?	Queries the harmonic measurement numeric list data.	5-75
:NUMeric:NORMal?	Queries all numeric data output settings.	5-75
:NUMeric[:NORMal]:CLEar	Clears numeric data output items (sets the items to NONE).	5-76
:NUMeric[:NORMal]:DELete	Deletes numeric data output items.	5-76
:NUMeric[:NORMal]:ITEM<x>	Sets or queries the specified numeric data output item (function, element, and harmonic order).	5-76
:NUMeric[:NORMal]:NUMber	Sets or queries the number of numeric data items that are transmitted by the :NUMeric[:NORMal]:VALue? command.	5-76
:NUMeric[:NORMal]:PRESet	Presets the numeric data output item pattern.	5-76
:NUMeric[:NORMal]:VALue?	Queries the numeric data.	5-77

RATE Group

:RATE	Sets or queries the data update rate.	5-83

STATus Group

:STATus?	Queries all the settings for the communication status feature.	5-84
:STATus:CONDition?	Queries the contents of the condition register.	5-84
:STATus:EESE	Sets or queries the extended event enable register.	5-84
:STATus:EESR?	Queries the contents of the extended event register and clears the register.	5-84
:STATus:ERRor?	Queries the error code and message of the last error that has occurred (top of the error queue).	5-84
:STATus:FILTer<x>	Sets or queries the transition filter.	5-84
:STATus:QENable	Sets or queries whether messages other than errors will be stored to the error queue (ON/OFF).	5-84
:STATus:QMESsage	Sets or queries whether message information will be attached to the response to the STATus:ERRor? query (ON/OFF).	5-84
:STATus:SPOLl?	Executes serial polling.	5-84

STORe Group

Command	Function	Page
:STORe?	Queries all numeric data storage settings.	5-85
:STORe:COUNt	Sets or queries the storage count.	5-85
:STORe:FILE?	Queries all settings related to the saving of the data stored in the WT1800 to files.	5-85
:STORe:FILE:ANAMing	Sets or queries the auto naming feature for saving stored numeric data to files.	5-85
:STORe:FILE:CDIRectory	Changes the directory that stored numeric data is saved to.	5-85
:STORe:FILE:CONVert?	Queries all settings related to the conversion of stored numeric data files into CSV format.	5-85
:STORe:FILE:CONVert:ABORt	Aborts the conversion of a numeric data file to CSV format.	5-85
:STORe:FILE:CONVert:AUTO	Sets or queries the on/off status of the automatic conversion of stored numeric data files to CSV format.	5-85
:STORe:FILE:CONVert:EXECute	Converts the specified stored numeric data file to CSV format.	5-85
:STORe:FILE:DRIVe	Sets the drive that stored numeric data is saved to.	5-85
:STORe:FILE:FREE?	Queries the free space (in bytes) on the drive that the stored numeric data is saved to.	5-85
:STORe:FILE:NAME	Sets or queries the name of the file that stored numeric data is saved to.	5-86
:STORe:FILE:PATH?	Queries the absolute path of the directory that the stored numeric data is saved to.	5-86
:STORe:INTerval	Sets or queries the storage interval.	5-86
:STORe:NUMeric?	Queries all numeric data storage item settings.	5-86
:STORe:NUMeric:ITEM	Sets or queries the numeric data storage item selection method.	5-86
:STORe:NUMeric:NORMal?	Queries all numeric data storage item settings (for the manual selection method).	5-86
:STORe:NUMeric[:NORMal]:ALL	Collectively sets the on/off status of the output of all element functions when numeric data is stored.	5-86
:STORe:NUMeric[:NORMal]:{ELEMent<x>|SIGMA|SIGMB|SIGMC}	Sets or queries the on/off status of the output of the specified element or wiring unit ΣA, ΣB, or ΣC when numeric data is stored.	5-86
:STORe:NUMeric[:NORMal]:<Function>	Sets or queries the on/off status of the specified function's output when numeric data is stored.	5-86
:STORe:NUMeric[:NORMal]:PRESet<x>	Presets the output on/off pattern of the element functions to be used when numeric data is stored.	5-87
:STORe:RESet	Resets the numeric data storage feature.	5-87
:STORe:RTIMe?	Queries the storage start and end times for real-time storage mode.	5-87
:STORe:RTIMe:{STARt|END}	Sets or queries the storage start or end time for real-time storage mode.	5-87
:STORe:SASTart	Sets or queries whether numeric data is stored when storage starts.	5-87
:STORe:SMODe	Sets or queries the storage mode.	5-87
:STORe:STARt	Begins the storing of numeric data.	5-87
:STORe:STATe?	Sets or queries the storage state.	5-87
:STORe:STOP	Stops the storing of numeric data.	5-87
:STORe:TEVent	Sets or queries the event that the event-synchronized storage mode will trigger on.	5-87

SYSTem Group

:SYSTem?	Queries all system settings.	5-88
:SYSTem:CLOCk?	Queries all date/time settings.	5-88
:SYSTem:CLOCk:DISPlay	Sets or queries the on/off status of the date/time display.	5-88
:SYSTem:CLOCk:SNTP?	Queries all settings related to using SNTP to set the date and time.	5-88
:SYSTem:CLOCk:SNTP[:EXECute]	Uses SNTP to set the date and time.	5-88
:SYSTem:CLOCk:SNTP:GMTTime	Sets or queries the time difference from Greenwich Mean Time.	5-88
:SYSTem:CLOCk:TYPE	Sets or queries the date/time setup method.	5-88
:SYSTem:DATE	Sets or queries the date.	5-88
:SYSTem:DFLow:FREQuency	Sets or queries the frequency data display format when a low frequency (or no frequency) input is applied.	5-88
:SYSTem:DFLow:MOTor	Sets or queries the motor data display format when no pulse is applied.	5-88
:SYSTem:DPOint	Sets or queries the type of decimal point that is used when saving various data in ASCII format (CSV).	5-88
:SYSTem:ECLear	Clears error messages displayed on the screen.	5-88
:SYSTem:FONT	Sets or queries the menu and message font size.	5-89
:SYSTem:KLOCk	Sets or queries the on/off status of the key lock.	5-89

Command	Function	Page
:SYSTem:LANGuage?	Queries all display language settings.	5-89
:SYSTem:LANGuage:MENU	Sets or queries the menu language.	5-89
:SYSTem:LANGuage:MESSage	Sets or queries the message language.	5-89
:SYSTem:LCD?	Queries all LCD settings.	5-89
:SYSTem:LCD:AOFF?	Queries all the settings for the feature that automatically turns off the backlight.	5-89
:SYSTem:LCD:AOFF[:STATe]	Sets or queries the on/off status of the feature that automatically turns off the backlight.	5-89
:SYSTem:LCD:AOFF:TIME	Sets or queries the amount of time until the backlight is automatically turned off.	5-89
:SYSTem:LCD:BRIGhtness	Sets or queries the LCD brightness.	5-89
:SYSTem:LCD:COLor?	Queries all LCD color settings.	5-89
:SYSTem:LCD:COLor:BASecolor	Sets or queries the screen (menu) base color.	5-89
:SYSTem:LCD:COLor:GRAPh?	Queries all waveform color settings.	5-89
:SYSTem:LCD:COLor:GRAPh:CHANnel<x>	Sets or queries the specified waveform's color.	5-90
:SYSTem:LCD:COLor:GRAPh:PRESet	Presets the waveform color pattern.	5-90
:SYSTem:LCD:COLor:INTENsity:GRID	Sets or queries the grid intensity.	5-90
:SYSTem:LCD[:STATe]	Sets or queries the on/off status of the backlight.	5-90
:SYSTem:MODel?	Queries the model code.	5-90
:SYSTem:RESolution	Sets or queries the numeric data display resolution.	5-90
:SYSTem:SERial?	Queries the serial number.	5-90
:SYSTem:SUFFix?	Queries the suffix code.	5-90
:SYSTem:TIME	Sets or queries the time.	5-90
:SYSTem:USBKeyboard	Sets or queries the USB keyboard type.	5-90

WAVeform Group

:WAVeform?	Queries all waveform display data output settings.	5-91
:WAVeform:BYTeorder	Sets or queries the output byte order of the waveform display data (FLOAT format) that is transmitted by the :WAVeform:SEND? command.	5-91
:WAVeform:END	Sets or queries the output end point of the waveform display data that is transmitted by the :WAVeform:SEND? command.	5-91
:WAVeform:FORMat	Sets or queries the format of the waveform display data that is transmitted by the :WAVeform:SEND? command.	5-91
:WAVeform:HOLD	Sets or queries the on/off (hold/release) status of the waveform display data hold feature for all waveforms.	5-91
:WAVeform:LENGth?	Queries the total number of points of the waveform specified by the :WAVeform:TRACe command.	5-91
:WAVeform:SEND?	Queries the waveform display data specified by the :WAVeform:TRACe command.	5-92
:WAVeform:SRATe?	Queries the sample rate of the acquired waveform.	5-92
:WAVeform:STARt	Sets or queries the output start point of the waveform display data that is transmitted by the :WAVeform:SEND? command.	5-92
:WAVeform:TRACe	Sets or queries the target waveform for the :WAVeform:SEND? command.	5-92
:WAVeform:TRIGger?	Queries the trigger position of the acquired waveform.	5-92

Common Command Group

*CAL?	Executes zero calibration (zero-level compensation, the same operation as pressing CAL—SHIFT+SINGLE) and queries the result.	5-93
*CLS	Clears the standard event register, extended event register, and error queue.	5-93
*ESE	Sets or queries the standard event enable register.	5-93
*ESR?	Queries and clears the standard event register.	5-93
*IDN?	Queries the instrument model.	5-93
*OPC	Sets bit 0 (the OPC bit) of the standard event register to 1 upon the completion of the specified overlap command.	5-93
*OPC?	Returns ASCII code 1 if the specified overlap command has finished.	5-94
*OPT?	Queries the installed options.	5-94
*RST	Initializes the settings.	5-94
*SRE	Sets or queries the service request enable register.	5-94
*STB?	Queries the status byte register.	5-94

Command	Function	Page
*TRG	Executes single measurement (the same operation as when SINGLE is pressed).	5-94
*TST?	Performs a self-test and queries the result.	5-95
*WAI	Holds the execution of the subsequent command until the completion of the specified overlap command.	5-95

5.2 AOUTput Group

The commands in this group deal with D/A output.
You can make the same settings and queries that you can make by pressing UTILITY on the front panel, and then using the D/A Output Items menu.
The commands in this group are only valid on models with the D/A output (/DA) option.

:AOUTput?

Function Queries all D/A output settings.
Syntax `:AOUTput?`

:AOUTput:NORMal?

Function Queries all D/A output settings.
Syntax `:AOUTput:NORMal?`

:AOUTput[:NORMal]:CHANnel<x>

Function Sets or queries a D/A output item (function, element, or harmonic order).
Syntax
```
:AOUTput[:NORMal]:CHANnel<x> {NONE|
<Function>[,<Element>][,<Order>]}
:AOUTput[:NORMal]:CHANnel<x>?
<x> = 1 to 20 (output channel)
NONE = No output item
<Function> = {URMS|IRMS|P|S|Q|...}
<Element> = {<NRf>|SIGMA|SIGMB|SIGMC}
(<NRf> = 1 to 6)
<Order> = {TOTal|DC|<NRf>}
(<NRf> = 1 to 500)
```
Example
```
:AOUTPUT:NORMAL:CHANNEL1 URMS,1
:AOUTPUT:NORMAL:CHANNEL1? ->
:AOUTPUT:NORMAL:CHANNEL1 URMS,1
:AOUTPUT:NORMAL:CHANNEL1 UK,1,1
:AOUTPUT:NORMAL:CHANNEL1? ->
:AOUTPUT:NORMAL:CHANNEL1 UK,1,1
```
Description
- For information about the options available for <Function>, see Function Option List (1), in the DISPlay Group section on page 5-37.
- If <Element> is omitted, the element is set to 1.
- If <Order> is omitted, the order is set to TOTal.
- <Element> and <Order> are omitted from responses to functions that do not need them.

:AOUTput[:NORMal]:IRTime

Function Sets or queries the integration time that is used in the D/A output of the integrated value.
Syntax
```
:AOUTput[:NORMal]:IRTime
{<NRf>,<NRf>,<NRf>}
:AOUTput[:NORMal]:IRTime?
{<NRf>,<NRf>,<NRf>} = 0,0,0 to
10000,0,0
First <NRf> = 0 to 10000 (hours)
Second <NRf> = 0 to 59 (minutes)
Third <NRf> = 0 to 59 (seconds)
```
Example
```
:AOUTPUT:NORMAL:IRTIME 1,0,0
:AOUTPUT:NORMAL:IRTIME? ->
:AOUTPUT:NORMAL:IRTIME 1,0,0
```

:AOUTput[:NORMal]:MODE<x>

Function Sets or queries the rated-value setup mode for D/A output items.
Syntax
```
:AOUTput[:NORMal]:
MODE<x>{FIXed|MANual}
:AOUTput[:NORMal]:MODE<x>?
<x> = 1 to 20 (output channel)
```
Example
```
:AOUTPUT:NORMAL:MODE1 FIXED
:AOUTPUT:NORMAL:MODE1? ->
:AOUTPUT:NORMAL:MODE1 FIXED
```

:AOUTput[:NORMal]:RATE<x>

Function Sets or queries the rated maximum or minimum value for D/A output items.
Syntax
```
:AOUTput[:NORMal]:RATE<x>{<NRf>,
<NRf>}
:AOUTput[:NORMal]:RATE<x>?
<x> = 1 to 20 (output channel)
<NRf> = -9.999E+12 to 9.999E+12
```
Example
```
:AOUTPUT:NORMAL:RATE1 100,-100
:AOUTPUT:NORMAL:RATE1? ->
:AOUTPUT:NORMAL:
RATE1 100.0E+00,-100.0E+00
```
Description
- Set the upper limit and then the lower limit.
- This setting is valid when the D/A output rated-value setup mode (:AOUTput [:NORMal]: MODE<x>) is set to MANual.

5.3 AUX Group

The commands in this group deal with the auxiliary input feature.
You can make the same settings and queries that you can make by pressing MOTOR/AUX SET (SHIFT+SCALING) on the front panel.
The commands in this group are only valid on models with the auxiliary input (/AUX) option.

:AUX<x>?

Function Queries all auxiliary input settings.
Syntax
```
:AUX<x>?
<x> = 1 or 2 (AUX input channel)
```

:AUX<x>:AUTO

Function Sets or queries the voltage auto range on/off status of the specified auxiliary input.
Syntax
```
:AUX<x>:AUTO {<Boolean>}
:AUX<x>:AUTO?
<x> = 1 or 2 (AUX input channel)
```
Example
```
:AUX1:AUTO ON
:AUX1:AUTO? -> :AUX1:AUTO 1
```

:AUX<x>:FILTer?

Function Queries all input filter settings for the auxiliary inputs.
Syntax
```
:AUX<x>:FILTer?
```
Description The <x> value in AUX<x> has no meaning in the setting or query.

:AUX<x>:FILTer[:LINE]

Function Sets or queries the line filter for the auxiliary inputs.
Syntax
```
:AUX<x>:FILTer[:LINE]
{OFF|<Frequency>}
:AUX<x>:FILTer:LINE?
OFF = Line filter off
<Frequency> = 100 Hz, 1 kHz (when the
line filter is on; cutoff frequency)
```
Example
```
:AUX:FILTER:LINE OFF
:AUX:FILTER:LINE? ->
:AUX1:FILTER:LINE OFF
```
Description The <x> value in AUX<x> has no meaning in the setting or query.

:AUX<x>:LSCale?

Function Queries all auxiliary input linear scaling settings.
Syntax
```
:AUX<x>:LSCale?
<x> = 1 or 2 (AUX input channel)
```

:AUX<x>:LSCale:AVALue

Function Sets or queries the slope (A) of the linear scale of the auxiliary input feature.
Syntax
```
:AUX<x>:LSCale:AVALue {<NRf>}
:AUX<x>:LSCale:AVALue?
<x> = 1 or 2 (AUX input channel)
<NRf> = 1.000E-03 to 1.000E+06
```
Example
```
:AUX1:LSCALE:AVALUE 1.000
:AUX1:LSCALE:AVALUE? ->
:AUX1:LSCALE:AVALUE 1.000E+00
```

:AUX<x>:LSCale:BVALue

Function Sets or queries the offset (B) of the linear scale of the auxiliary input feature.
Syntax
```
:AUX<x>:LSCale:BVALue {<NRf>}
:AUX<x>:LSCale:BVALue?
<x> = 1 or 2 (AUX input channel)
<NRf> = -1.000E+06 to 1.000E+06
```
Example
```
:AUX1:LSCALE:BVALUE 0
:AUX1:LSCALE:BVALUE? ->
:AUX1:LSCALE:BVALUE 0.000E+00
```

:AUX<x>:LSCale:CALCulate?

Function Queries all parameter calculation settings for the linear scale of the auxiliary input feature.
Syntax
```
:AUX<x>:LSCale:CALCulate?
<x> = 1 or 2 (AUX input channel)
```

:AUX<x>:LSCale:CALCulate:{P1X|P1Y|P2X|P2Y}

Function Sets or queries the data (Point1X, Point1Y, Point2X, or Point2Y) for parameter calculations of the linear scale of the auxiliary input feature.
Syntax
```
:AUX<x>:LSCale:CALCulate:
{P1X|P1Y|P2X|P2Y} {<NRf>}
:AUX<x>:LSCale:CALCulate:
{P1X|P1Y|P2X|P2Y}?
<x> = 1 or 2 (AUX input channel)
<NRf> = -1.000E+12 to 1.000E+12
```
Example
```
:AUX1:LSCALE:CALCULATE:P1X 0
:AUX1:LSCALE:CALCULATE:P1X? ->
:AUX1:LSCALE:CALCULATE:P1X 0.000E+00
```

:AUX<x>:LSCale:CALCulate:EXECute

Function Calculates parameters for the linear scale of the auxiliary input feature.

Syntax
```
:AUX<x>:LSCale:CALCulate:EXECute
<x> = 1 or 2 (AUX input channel)
```

Example
```
:AUX1:LSCALE:CALCULATE:EXECUTE
```

Description The WT1800 uses the data that has been specified (Point1X, Point1Y, Point2X, and Point2Y) to calculate and set the slope (A) and offset (B) of the linear scale.

:AUX<x>:NAME

Function Sets or queries the auxiliary input name.

Syntax
```
:AUX<x>:NAME {<String>}
:AUX<x>:NAME?
<x> = 1 or 2 (AUX input channel)
<String> = Up to 8 characters
```

Example
```
:AUX1:NAME "AUX1"
:AUX1:NAME? ->
:AUX1:NAME "AUX1"
```

:AUX<x>:RANGe

Function Sets or queries the auxiliary input voltage range.

Syntax
```
:AUX<x>:RANGe {<Voltage>}
:AUX<x>:RANGe?
<x> = 1 or 2 (AUX input channel)
<Voltage> = 50 mV, 100 mV, 200 mV,
500 mV, 1 V, 2 V, 5 V, 10 V, 20 V
```

Example
```
:AUX1:RANGE 20V
:AUX1:RANGE? ->
:AUX1:RANGE 20.00E+00
```

:AUX<x>:SCALing

Function Sets or queries the auxiliary input scaling factor.

Syntax
```
:AUX<x>:SCALing {<NRf>}
:AUX<x>:SCALing?
<x> = 1 or 2 (AUX input channel)
<NRf> = 0.0001 to 99999.9999
```

Example
```
:AUX1:SCALING 1
:AUX1:SCALING? ->
:AUX1:SCALING 1.0000
```

:AUX<x>:UNIT

Function Sets or queries the unit to assign to the auxiliary input.

Syntax
```
:AUX<x>:UNIT {<String>}
:AUX<x>:UNIT?
<x> = 1 or 2 (AUX input channel)
<String> = Up to 8 characters
```

Example
```
:AUX1:UNIT "kW/m2"
:AUX1:UNIT? ->
:AUX1:UNIT "kW/m2"
```

Description This command has no effect on the computation result.

5.4 COMMunicate Group

The commands in this group deal with communications. There are no front panel keys that correspond to the commands in this group.

:COMMunicate?

Function Queries all communication settings.

Syntax `:COMMunicate?`

:COMMunicate:HEADer

Function Sets or queries whether a header is added to the response to a query. (Example with header: ": DISPLAY:MODE NUMERIC." Example without header: "NUMERIC.")

Syntax
```
:COMMunicate:HEADer {<Boolean>}
:COMMunicate:HEADer?
```

Example
```
:COMMUNICATE:HEADER ON
:COMMUNICATE:HEADER? ->
:COMMUNICATE:HEADER 1
```

:COMMunicate:LOCKout

Function Sets or clears local lockout.

Syntax
```
:COMMunicate:LOCKout {<Boolean>}
:COMMunicate:LOCKout?
```

Example
```
:COMMUNICATE:LOCKOUT ON
:COMMUNICATE:LOCKOUT? ->
:COMMUNICATE:LOCKOUT 1
```

:COMMunicate:OPSE

Function Sets or queries the overlap command that is used by the *OPC, *OPC?, and *WAI commands.

Syntax
```
:COMMunicate:OPSE <Register>
:COMMunicate:OPSE?
<Register> = 0 to 65535,
See the figure for the :COMMunicate:
OPSR? command.
```

Example
```
:COMMUNICATE:OPSE 65535
:COMMUNICATE:OPSE? ->
:COMMUNICATE:OPSE 96
```

Description In the above example, all bits are set to 1 to make all overlap commands applicable. However, bits fixed to 0 are not set to 1, so the response to the query only indicates 1 for bits 5 and 6.

:COMMunicate:OPSR?

Function Queries the operation pending status register.

Syntax `:COMMunicate:OPSR?`

Example `:COMMunicate:OPSR? -> 0`

Description Operation pending status register and overlap enable register

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	0	ACS	PRN	0	0	0	0	0

When bit 5 (PRN) = 1: Built-in printer operation is incomplete.

When bit 6 (ACS) = 1: Storage media access is incomplete.

:COMMunicate:OVERlap

Function Sets or queries the commands that operate as overlap commands.

Syntax
```
:COMMunicate:OVERlap <Register>
:COMMunicate:OVERlap?
<Register> = 0 to 65535,
See the figure for the :COMMunicate:
OPSR? command.
```

Example
```
:COMMUNICATE:OVERLAP 65535
:COMMUNICATE:OVERLAP? ->
:COMMUNICATE:OVERLAP 96
```

Description
- In the above example, all bits are set to 1 to make all overlap commands applicable. However, bits fixed to 0 are not set to 1, so the response to the query only indicates 1 for bits 5 and 6.
- For information about how to synchronize a program using COMMunicate:OVERlap, see page 4-8.
- In the above example, bits 5 and 6 are set to 1 to make all overlap commands applicable (see the figure for the :COMMunicate:OPSR? command).

:COMMunicate:REMote

Function Sets the WT1800 to remote or local mode. On is remote mode.

Syntax
```
:COMMunicate:REMote {<Boolean>}
:COMMunicate:REMote?
```

Example
```
:COMMUNICATE:REMOTE ON
:COMMUNICATE:REMOTE? ->
:COMMUNICATE:REMOTE 1
```

:COMMunicate:VERBose

Function Sets or queries whether the response to a query is returned fully spelled out (example: ":INPUT:VOLTAGE:RANGE:ELEMENT1 1.000E+03") or in its abbreviated form (example: "VOLT:RANG:ELEM 1.000E+03").

Syntax
```
:COMMunicate:VERBose {<Boolean>}
:COMMunicate:VERBose?
```

Example
```
:COMMUNICATE:VERBOSE ON
:COMMUNICATE:VERBOSE? ->
:COMMUNICATE:VERBOSE 1
```

:COMMunicate:WAIT

Function Waits for a specified extended event to occur.

Syntax
```
:COMMunicate:WAIT <Register>
<Register> = 0 to 65535 (Extended
event register. For more information,
see page 6-5.)
```

Example
```
:COMMUNICATE:WAIT 1
```

Description For information about how to synchronize a program using COMMunicate:WAIT, see page 4-9.

:COMMunicate:WAIT?

Function Creates the response that is returned when a specified extended event occurs.

Syntax
```
:COMMunicate:WAIT? <Register>
```
<Register> = 0 to 65535 (Extended event register. For more information, see page 6-5.)

Example
```
:COMMUNICATE:WAIT? 65535 -> 1
```

5.5 CURSor Group

The commands in this group deal with cursor measurements. You can make the same settings and queries (of settings and measured values) that you can make by pressing CURSOR (SHIFT+FORM) on the front panel.

:CURSor?
Function Queries all cursor measurement settings.
Syntax `:CURSor?`

:CURSor:BAR?
Function Queries all bar graph display cursor measurement settings.
Syntax `:CURSor:BAR?`
Description The bar graph display's cursor feature is only available on models with the harmonic measurement (/G5 or /G6) option.

:CURSor:BAR:LINKage
Function Sets or queries the on/off status of the cursor position linkage on the bar graph display.
Syntax
```
:CURSor:BAR:LINKage {<Boolean>}
:CURSor:BAR:LINKage?
```
Example
```
:CURSOR:BAR:LINKAGE OFF
:CURSOR:BAR:LINKAGE? ->
:CURSOR:BAR:LINKAGE 0
```

:CURSor:BAR:POSition<x>
Function Sets or queries the position of the specified cursor on the bar graph display.
Syntax
```
:CURSor:BAR:POSition<x> {<NRf>}
:CURSor:BAR:POSition<x>?
<x> = 1, 2 (1 = C1 +, 2 = C2 x)
<NRf> = 0 to 500
```
Example
```
:CURSOR:BAR:POSITION1 1
:CURSOR:BAR:POSITION1? ->
:CURSOR:BAR:POSITION1 1
```

:CURSor:BAR[:STATe]
Function Sets or queries the on/off status of the cursor display on the bar graph display.
Syntax
```
:CURSor:BAR[:STATe] {<Boolean>}
:CURSor:BAR:STATe?
```
Example
```
:CURSOR:BAR:STATE ON
:CURSOR:BAR:STATE? ->
:CURSOR:BAR:STATE 1
```

:CURSor:BAR:{Y<x>|DY}?
Function Queries the measured value of the specified cursor on the bar graph display.
Syntax
```
:CURSor:BAR:{Y<x>|DY}?
Y<x> = Y-axis value of the cursor
position (Y1 = Y1 +, Y2 +, Y3 +; Y2
= Y1 x, Y2 x, Y3 x)
DY = Difference between the cursor
Y-axis values (DY1, DY2, DY3)
```
Example `:CURSOR:BAR:Y1? -> 78.628E+00`
Description
- When multiple bar graphs are displayed, the cursor measured values of each bar graph are returned in order.
- If the bar graph cursor display is not turned on, NAN (Not A Number) is returned.

:CURSor:TRENd?
Function Queries all trend display cursor measurement settings.
Syntax `:CURSor:TRENd?`

:CURSor:TRENd:LINKage
Function Sets or queries the on/off status of the cursor position linkage on the trend display.
Syntax
```
:CURSor:TRENd:LINKage {<Boolean>}
:CURSor:TRENd:LINKage?
```
Example
```
:CURSOR:TREND:LINKAGE OFF
:CURSOR:TREND:LINKAGE? ->
:CURSOR:TREND:LINKAGE 0
```

:CURSor:TRENd:POSition<x>
Function Sets or queries the position of the specified cursor on the trend display.
Syntax
```
:CURSor:TRENd:POSition<x> {<NRf>}
:CURSor:TRENd:POSition<x>?
<x> = 1, 2 (1 = C1 +, 2 = C2 x)
<NRf> = 0 to 1601
```
Example
```
:CURSOR:TREND:POSITION1 160
:CURSOR:TREND:POSITION1? ->
:CURSOR:TREND:POSITION1 160
```

:CURSor:TRENd[:STATe]
Function Sets or queries the on/off status of the cursor display on the trend display.
Syntax
```
:CURSor:TRENd[:STATe] {<Boolean>}
:CURSor:TRENd:STATe?
```
Example
```
:CURSOR:TREND:STATE ON
:CURSOR:TREND:STATE? ->
:CURSOR:TREND:STATE 1
```

:CURSor:TRENd:TRACe<x>

Function Sets or queries the target of the specified cursor on the trend display.

Syntax
```
:CURSor:TRENd:TRACe<x> {<NRf>}
:CURSor:TRENd:TRACe<x>?
<x> = 1, 2 (1 = C1 +, 2 = C2 x)
<NRf> = 1 to 16 (T1 to T16)
```

Example
```
:CURSOR:TREND:TRACE1 1
:CURSOR:TREND:TRACE1? ->
:CURSOR:TREND:TRACE1 1
```

:CURSor:TRENd:{X<x>|Y<x>|DY}?

Function Queries the measured value of the specified cursor on the trend display.

Syntax
```
:CURSor:TRENd:{X<x>|Y<x>|DY}?
X<x> = Trend time string of the
cursor position
(X1 = D+, X2 = Dx)
Y<x> = Y-axis value of the cursor
position
(Y1 = Y+, Y2 = Yx)
DY = Y-axis difference (DY) between
the cursors
```

Example
```
:CURSOR:TREND:X1? ->
"2010/01/01 12:34:56"
:CURSOR:TREND:Y1? -> 78.628E+00
```

Description If the trend cursor display is not turned on, the following results will be returned.
For X<x>: "****/**/** **:**:**" will be returned.
For Y<x> and DY: NAN (Not A Number) will be returned.

:CURSor:WAVE?

Function Queries all waveform display cursor measurement settings.

Syntax
```
:CURSor:WAVE?
```

:CURSor:WAVE:LINKage

Function Sets or queries the on/off status of the cursor position linkage on the waveform display.

Syntax
```
:CURSor:WAVE:LINKage {<Boolean>}
:CURSor:WAVE:LINKage?
```

Example
```
:CURSOR:WAVE:LINKAGE OFF
:CURSOR:WAVE:LINKAGE? ->
:CURSOR:WAVE:LINKAGE 0
```

:CURSor:WAVE:PATH

Function Sets or queries the cursor path on the waveform display.

Syntax
```
:CURSor:WAVE:PATH {MAX|MIN|MID}
:CURSor:WAVE:PATH?
```

Example
```
:CURSOR:WAVE:PATH MAX
:CURSOR:WAVE:PATH? ->
:CURSOR:WAVE:PATH MAX
```

:CURSor:WAVE:POSition<x>

Function Sets or queries the position of the specified cursor on the waveform display.

Syntax
```
:CURSor:WAVE:POSition<x> {<NRf>}
:CURSor:WAVE:POSition<x>?
<x> = 1, 2 (1 = C1 +, 2 = C2 x)
<NRf> = 0 to 800
```

Example
```
:CURSOR:WAVE:POSITION1 160
:CURSOR:WAVE:POSITION1? ->
:CURSOR:WAVE:POSITION1 160
```

:CURSor:WAVE[:STATe]

Function Sets or queries the on/off status of the cursor display on the waveform display.

Syntax
```
:CURSor:WAVE[:STATe] {<Boolean>}
:CURSor:WAVE:STATe?
```

Example
```
:CURSOR:WAVE:STATE ON
:CURSOR:WAVE:STATE? ->
:CURSOR:WAVE:STATE 1
```

:CURSor:WAVE:TRACe<x>

Function Sets or queries the target of the specified cursor on the waveform display.

Syntax
```
:CURSor:WAVE:TRACe<x> {U<x>|I<x>|
SPEed|TORQue|AUX<x>}
:CURSor:WAVE:TRACe<x>?
TRACe<x>'s <x> = 1, 2, (1 = C1 +, 2
= C2 x)
U<x> and I<x>'s <x> = 1 to 6 (element)
AUX<x>'s <x> = 1 or 2 (AUX input
channel)
```

Example
```
:CURSOR:WAVE:TRACE1 U1
:CURSOR:WAVE:TRACE1? ->
:CURSOR:WAVE:TRACE1 U1
```

Description
- SPEed and TORQue can only be selected on models with the motor evaluation function (/MTR) option.
- AUX<x> can only be selected on models with the auxiliary input (/AUX) option.

:CURSor:WAVE:{X<x>|DX|PERDt|Y<x>|DY}?

Function Queries the measured value of the specified cursor on the waveform display.

Syntax
```
:CURSor:WAVE:{X<x>|DX|PERDt|Y<x>|
DY}?
X<x> = X-axis value of the cursor
position
(X1 = X+, X2 = Xx)
DX = X-axis difference (DX) between
the cursors
PERDt = Value of 1/DT (1/DX) between
the cursors
Y<x> = Y-axis value of the cursor
position
(Y1 = Y+, Y2 = Yx)
DY = Y-axis difference (DY) between
the cursors
```

Example
```
:CURSOR:WAVE:Y1? -> 78.628E+00
```

Description If the waveform cursor display is not turned on, NAN (Not A Number) is returned.

5.6 DISPlay Group

The commands in this group deal with the display.
You can make the same settings and queries that you can make by pressing the keys in the front panel DISPLAY and ITEM & ELEMENT areas.

:DISPlay?

Function Queries all display settings.
Syntax `:DISPlay?`
Description Returns all settings that correspond to the current display mode (:DISPlay:MODE).

:DISPlay:BAR?

Function Queries all bar graph display settings.
Syntax `:DISPlay:BAR?`
Description The bar graph display is only available on models with the harmonic measurement (/G5 or /G6) option.

:DISPlay:BAR:FORMat

Function Sets or queries the bar graph display format.
Syntax
```
:DISPlay:BAR:FORMat {SINGle|DUAL|
TRIad}
:DISPlay:BAR:FORMat?
```
Example
```
:DISPLAY:BAR:FORMAT SINGLE
:DISPLAY:BAR:FORMAT? ->
:DISPLAY:BAR:FORMAT SINGLE
```

:DISPlay:BAR:ITEM<x>?

Function Queries all the display settings of the specified bar graph.
Syntax
```
:DISPlay:BAR:ITEM<x>?
<x> = 1 to 3 (item number)
```

:DISPlay:BAR:ITEM<x>[:FUNCtion]

Function Sets or queries the function and element of the specified bar graph item.
Syntax
```
:DISPlay:BAR:ITEM<x>[:
FUNCtion] {<Function>,<Element>}
:DISPlay:BAR:ITEM<x>:FUNCtion?
<x> = 1 to 3 (item number)
<Function> = {U|I|P|S|Q|LAMBda|PHI|
PHIU|PHII|Z|RS|XS|RP|XP}
<Element> = 1 to 6
```
Example
```
:DISPLAY:BAR:ITEM1 U,1
:DISPLAY:BAR:ITEM1? ->
:DISPLAY:BAR:ITEM1 U,1
```
Description For information about the options available for <Function>, see Function Option List (2) on page 5-40.

:DISPlay:BAR:ITEM<x>:SCALing?

Function Queries all scaling settings for the specified bar graph.
Syntax
```
:DISPlay:BAR:ITEM<x>:SCALing?
<x> = 1 to 3 (item number)
```

:DISPlay:BAR:ITEM<x>:SCALing:MODE

Function Sets or queries the scaling mode of the specified bar graph.
Syntax
```
:DISPlay:BAR:ITEM<x>:SCALing:
MODE {FIXed|MANual}
:DISPlay:BAR:ITEM<x>:SCALing:MODE?
<x> = 1 to 3 (item number)
```
Example
```
:DISPLAY:BAR:ITEM1:SCALING:
MODE FIXED
:DISPLAY:BAR:ITEM1:SCALING:MODE? ->
:DISPLAY:BAR:ITEM1:SCALING:
MODE FIXED
```

:DISPlay:BAR:ITEM<x>:SCALing:VALue

Function Sets or queries the upper limit of the manual scaling of the specified bar graph.
Syntax
```
:DISPlay:BAR:ITEM<x>:SCALing:
VALue {<NRf>}
:DISPlay:BAR:ITEM<x>:SCALing:VALue?
<x> = 1 to 3 (item number)
<NRf> = 0 to 9.999E+12
```
Example
```
:DISPLAY:BAR:ITEM1:SCALING:VALUE 100
:DISPLAY:BAR:ITEM1:SCALING:VALUE? ->
:DISPLAY:BAR:ITEM1:SCALING:
VALUE 100.0E+00
```
Description
- This command is valid when the scaling mode of the bar graph (:DISPlay:BAR:ITEM<x>:SCALing:MODE) is set to MANual.
- This command only sets the upper limit. The lower limit is determined automatically (as shown below) according to the vertical scaling mode (:DISPlay:BAR:ITEM<x>:SCALing:VERTical).

(1) When the mode is LINear: 0 when the X-axis position (:DISPlay:BAR:ITEM<x>:SCALing:XAXis) is “BOTTom;” the negative value of the upper limit when the X-axis position is “CENTer”
(2) When the mode is LOG: The upper limit/10000

:DISPlay:BAR:ITEM<x>:SCALing:VERTical

Function Sets or queries the vertical scaling mode of the specified bar graph.

Syntax
```
:DISPlay:BAR:ITEM<x>:SCALing:
VERTical {LINear|LOG}
:DISPlay:BAR:ITEM<x>:SCALing:
VERTical?
<x> = 1 to 3 (item number)
```

Example
```
:DISPLAY:BAR:ITEM1:SCALING:
VERTICAL LOG
:DISPLAY:BAR:ITEM1:SCALING:
VERTICAL? ->
:DISPLAY:BAR:ITEM1:SCALING:
VERTICAL LOG
```

Description This command is valid when the scaling mode of the bar graph (:DISPlay:BAR:ITEM<x>:SCALing:MODE) is set to MANual.

:DISPlay:BAR:ITEM<x>:SCALing:XAXis

Function Sets or queries the position of the X axis of the specified bar graph.

Syntax
```
:DISPlay:BAR:ITEM<x>:SCALing:
XAXis {BOTTom|CENTer}
:DISPlay:BAR:ITEM<x>:SCALing:
XAXis?
<x> = 1 to 3 (item number)
```

Example
```
:DISPLAY:BAR:ITEM1:SCALING:
XAXIS BOTTOM
:DISPLAY:BAR:ITEM1:SCALING:XAXIS? ->
:DISPLAY:BAR:ITEM1:SCALING:
XAXIS BOTTOM
```

Description This command is valid when the scaling mode of the bar graph (:DISPlay:BAR:ITEM<X>:SCALing:MODE) is set to MANual and the vertical scaling mode of the bar graph (:DISPlay:BAR:ITEM<x>:SCALing:VERTical) is set to LINear.

:DISPlay:BAR:ORDer

Function Sets or queries the displayed starting and ending harmonic orders of the bar graphs.

Syntax
```
:DISPlay:BAR:ORDer {<NRf>,<NRf>}
:DISPlay:BAR:ORDer?
First <NRf> = 0 to 490 (displayed
starting harmonic order)
Second <NRf> = 10 to 500 (displayed
ending harmonic order)
```

Example
```
:DISPLAY:BAR:ORDER 1,100
:DISPLAY:BAR:ORDER? ->
:DISPLAY:BAR:ORDER 1,100
```

Description
- Set the starting harmonic order and then the ending harmonic order.
- Set the ending harmonic order to a value greater than or equal to that of the starting harmonic order + 10.

:DISPlay:INFOrmation?

Function Queries all setup parameter list display settings.

Syntax
```
:DISPlay:INFOrmation?
```

:DISPlay:INFOrmation:PAGE

Function Sets or queries the displayed page of the setup parameter list display.

Syntax
```
:DISPlay:INFOrmation:PAGE {POWer|
RANGe|<NRf>}
:DISPlay:INFOrmation:PAGE?
POWer (or <NRf> = 1) =
Tables of each element's measurement
conditions (Power Element Settings)
RANGe (or <NRf> = 2) =
Indicators of each element's voltage
and current range settings (Range
Settings)
```

Example
```
:DISPLAY:INFORMATION:PAGE POWER
:DISPLAY:INFORMATION:PAGE? ->
:DISPLAY:INFORMATION:PAGE POWER
```

:DISPlay:INFOrmation[:STATe]

Function Sets or queries the on/off status of the setup parameter list display.

Syntax
```
:DISPlay:INFOrmation[:
STATe] {<Boolean>}
:DISPlay:INFOrmation:STATe?
```

Example
```
:DISPLAY:INFORMATION:STATE ON
:DISPLAY:INFORMATION:STATE? ->
:DISPLAY:INFORMATION:STATE 1
```

:DISPlay:MODE

Function Sets or queries the display mode.

Syntax
```
:DISPlay:MODE {NUMeric|WAVE|TRENd|
BAR|VECTor|NWAVe|NTRend|NBAR|
NVECtor|WNUMeric|WTRend|WBAR|
WVECtor|TNUMeric|TWAVe|TBAR|TVECtor}
:DISPlay:MODE?
NUMeric = Numeric display
WAVE = Waveform display
TRENd = Trend display
BAR = Bar graph display
VECTor = Vector display
NWAVe = Numeric and waveform displays
NTRend = Numeric and trend displays
NBAR = Numeric and bar graph displays
NVECtor = Numeric and vector displays
WNUMeric = Waveform and numeric
displays
WTRend = Waveform and trend displays
WBAR = Waveform and bar graph
displays
WVECtor = Waveform and vector
displays
TNUMeric = Trend and numeric displays
TWAVe = Trend and waveform displays
TBAR = Trend and bar graph displays
TVECtor = Trend and vector displays
```

Example
```
:DISPLAY:MODE NUMERIC
:DISPLAY:MODE? ->
:DISPLAY:MODE NUMERIC
```

Description BAR, VECTor, NBAR, NVECtor, WBAR, WVECtor, TBAR, and TVECtor can only be selected on models with the harmonic measurement (/G5 or /G6) option.

:DISPlay:NUMeric?
Function Queries all numeric display settings.
Syntax :DISPlay:NUMeric?

:DISPlay:NUMeric:CUSTom?
Function Queries all numeric display settings in custom display mode.
Syntax :DISPlay:NUMeric:CUSTom?

:DISPlay:NUMeric:CUSTom:FILE:CDIRectory
Function Changes the directory that files are loaded from or saved to for the numeric display in custom display mode.
Syntax :DISPlay:NUMeric:CUSTom:FILE:CDIRectory {<String>}
<String> = Directory name
Example :DISPLAY:NUMERIC:CUSTOM:FILE:CDIRECTORY "CUSTOM"
Description Specify ".." to move up to the parent directory.

:DISPlay:NUMeric:CUSTom:FILE:DRIVe
Function Sets the drive that files are loaded from or saved to for the numeric display in custom display mode.
Syntax :DISPlay:NUMeric:CUSTom:FILE:DRIVe {RAM|USB[,<NRf>]|NETWork}
RAM = Built-in RAM drive
USB = USB memory device drive,
<NRf> = 0 or 1 (drive number)
NETWork = Network drive
Example :DISPLAY:NUMERIC:CUSTOM:FILE:DRIVE USB,0

:DISPlay:NUMeric:CUSTom:FILE:FREE?
Function Queries the amount of free space (in bytes) on the drive that files are loaded from or saved to for the numeric display in custom display mode.
Syntax :DISPlay:NUMeric:CUSTom:FILE:FREE?
Example :DISPLAY:NUMERIC:CUSTOM:FILE:FREE? -> 20912128

:DISPlay:NUMeric:CUSTom:FILE:LOAD:ABORt
Function Aborts a file loading operation for the numeric display in custom display mode.
Syntax :DISPlay:NUMeric:CUSTom:FILE:LOAD:ABORt
Example :DISPLAY:NUMERIC:CUSTOM:FILE:LOAD:ABORT

:DISPlay:NUMeric:CUSTom:FILE:LOAD:BMP
Function Loads the specified background file for the numeric display in custom display mode.
Syntax :DISPlay:NUMeric:CUSTom:FILE:LOAD:BMP {<String>}
<String> = File name
Example :DISPLAY:NUMERIC:CUSTOM:FILE:LOAD:BMP "CUSTOM1"
Description
- Specify the file name without its extension (.bmp).
- This command is an overlap command.

:DISPlay:NUMeric:CUSTom:FILE:LOAD:BOTH
Function Loads the specified display configuration and background files for the numeric display in custom display mode.
Syntax :DISPlay:NUMeric:CUSTom:FILE:LOAD:BOTH {<String>}
<String> = File name
Example :DISPLAY:NUMERIC:CUSTOM:FILE:LOAD:BOTH "CUSTOM1"
Description
- Specify the file name without an extension.
- This command is an overlap command.

:DISPlay:NUMeric:CUSTom:FILE:LOAD:ITEM
Function Loads the specified display configuration file for the numeric display in custom display mode.
Syntax :DISPlay:NUMeric:CUSTom:FILE:LOAD:ITEM {<String>}
<String> = File name
Example :DISPLAY:NUMERIC:CUSTOM:FILE:LOAD:ITEM "CUSTOM1"
Description
- Specify the file name without its extension (.txt).
- This command is an overlap command.

:DISPlay:NUMeric:CUSTom:FILE:PATH?
Function Queries the absolute path of the directory that files are loaded from or saved to for the numeric display in custom display mode.
Syntax :DISPlay:NUMeric:CUSTom:FILE:PATH?
Example :DISPLAY:NUMERIC:CUSTOM:FILE:PATH? -> "USB-0/CUSTOM"

:DISPlay:NUMeric:CUSTom:FILE:SAVE:ANAMing

Function Sets or queries the automatic file name generation feature for saving display configuration files of the numeric display in custom display mode.

Syntax
```
:DISPlay:NUMeric:CUSTom:FILE:SAVE:
ANAMing {OFF|NUMBering|DATE}
:DISPlay:NUMeric:CUSTom:FILE:SAVE:
ANAMing?
```

Example
```
:DISPLAY:NUMERIC:CUSTOM:FILE:SAVE:
ANAMING NUMBERING
:DISPLAY:NUMERIC:CUSTOM:FILE:SAVE:
ANAMING? ->
:DISPLAY:NUMERIC:CUSTOM:FILE:SAVE:
ANAMING NUMBERING
```

:DISPlay:NUMeric:CUSTom:FILE:SAVE:ITEM

Function Saves the specified display configuration file for the numeric display in custom display mode.

Syntax
```
:DISPlay:NUMeric:CUSTom:FILE:SAVE:
ITEM {<String>}
<String> = File name
```

Example
```
:DISPLAY:NUMERIC:CUSTOM:FILE:SAVE:
ITEM "CUSTOM1"
```

Description
- Specify the file name without its extension (.txt).
- This command is an overlap command.

:DISPlay:NUMeric:CUSTom:ITEM<x>?

Function Queries all the settings of the specified display item of the numeric display in custom display mode.

Syntax
```
:DISPlay:NUMeric:CUSTom:ITEM<x>?
<x> = 1 to 192 (item number)
```

:DISPlay:NUMeric:CUSTom:ITEM<x>:COLor

Function Sets or queries the font color of the specified display item of the numeric display in custom display mode.

Syntax
```
:DISPlay:NUMeric:CUSTom:ITEM<x>:
COLor {YELLow|GREen|MAGenta|CYAN|
RED|ORANge|LBLue|PURPle|BLUE|PINK|
LGReen|DBLue|BGReen|SPINk|MGReen|
GRAY|WHITE|DGRAY|BGRAY|BLACk}
:DISPlay:NUMeric:CUSTom:ITEM<x>:
COLor?
<x> = 1 to 192 (item number)
YELLow = Yellow
GREen = Green
MAGenta = Magenta
CYAN = Cyan
RED = Red
ORANge = Orange
LBLue = Light blue
PURPle = Purple
BLUE = Blue
PINK = Pink
LGReen = Light green
DBLue = Dark blue
BGReen = Blue green
SPINk = Salmon pink
MGReen = Mild green
GRAY = Gray
WHITE = White
DGRAY = Dark gray
BGRAY = Blue gray
BLACk = Black
```

Example
```
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
COLOR WHITE
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
COLOR? ->
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
COLOR WHITE
```

:DISPlay:NUMeric:CUSTom:ITEM<x>[:FUNCtion]

Function Sets or queries the display item (numeric item or string) of the numeric display in custom display mode.

Syntax
```
:DISPlay:NUMeric:CUSTom:
ITEM<x>[:FUNCtion] {<Function>
[,<Element>][,<Order>]|<String>}
:DISPlay:NUMeric:CUSTom:
ITEM<x>[:FUNCtion]?
<x> = 1 to 192 (item number)
```
• When setting a numeric item
```
<Function> = {URMS|IRMS|P|S|Q|...}
<Element> = {<NRf>|SIGMA|SIGMB|SIGMC}
(<NRf> = 1 to 6)
<Order> = {TOTal|DC|<NRf>}
(<NRf> = 1 to 500)
```
• When setting a string
```
<String> = Up to 16 characters
```

Example
• When setting a numeric item
```
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
FUNCTION URMS,1
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
FUNCTION? ->
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
FUNCTION URMS,1
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
FUNCTION UK,1,1
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
FUNCTION? ->
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
FUNCTION UK,1,1
```
• When setting a string
```
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
FUNCTION "YOKOGAWA"
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
FUNCTION? ->
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
FUNCTION "YOKOGAWA"
```

Description
• Set a numeric item or a string as a display item.
(1) When setting a numeric item
• For information about the options available for <Function>, see Function Option List (1) on page 5-37.
• If <Element> is omitted, the element is set to 1.
• If <Order> is omitted, the order is set to TOTal.
• <Element> and <Order> are omitted from responses to functions that do not need them.
(2) When setting a string
• You can display any string that you want, for example, the header or unit of a numeric item.

:DISPlay:NUMeric:CUSTom:ITEM<x>:POSition

Function Sets or queries the display position of the specified display item of the numeric display in custom display mode.

Syntax
```
:DISPlay:NUMeric:CUSTom:ITEM<x>:
POSition {<NRf>,<NRf>}
:DISPlay:NUMeric:CUSTom:ITEM<x>:
POSition?
<x> = 1 to 192 (item number)
First <NRf> = 0 to 800 (X coordinate)
Second <NRf> = 0 to 672 (Y
coordinate)
```

Example
```
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
POSITION 0,0
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
POSITION? ->
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
POSITION 0,0
```

Description The upper-left corner of the numeric data display area is the origin, and the specified coordinate refers to the upper left of the display item.

:DISPlay:NUMeric:CUSTom:ITEM<x>:SIZE

Function Sets or queries the font size of the specified display item of the numeric display in custom display mode.

Syntax
```
:DISPlay:NUMeric:CUSTom:ITEM<x>:
SIZE {<NRf>}
:DISPlay:NUMeric:CUSTom:ITEM<x>:
SIZE?
<x> = 1 to 192 (item number)
<NRf> = 14, 16, 20, 24, 32, 48, 64,
96, 128
```

Example
```
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
SIZE 20
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
SIZE? ->
:DISPLAY:NUMERIC:CUSTOM:ITEM1:
SIZE 20
```

:DISPlay:NUMeric:CUSTom:PAGE

Function Sets or queries the displayed page of the numeric display in custom display mode.

Syntax
```
:DISPlay:NUMeric:CUSTom:PAGE {<NRf>}
:DISPlay:NUMeric:CUSTom:PAGE?
<NRf> = 1 to 12 (page number)
```

Example
```
:DISPLAY:NUMERIC:CUSTOM:PAGE 1
:DISPLAY:NUMERIC:CUSTOM:PAGE? ->
:DISPLAY:NUMERIC:CUSTOM:PAGE 1
```

Description The maximum page number that can be displayed is determined by the total number of display items and the number of items per page.

:DISPlay:NUMeric:CUSTom:PERPage

Function Sets or queries the number of items displayed per page of the numeric display in custom display mode.

Syntax
```
:DISPlay:NUMeric:CUSTom:
PERPage {<NRf>}
:DISPlay:NUMeric:CUSTom:
PERPage?
<NRf> = 1 to the total number of
display items
```

Example
```
:DISPLAY:NUMERIC:CUSTOM:PERPAGE 5
:DISPLAY:NUMERIC:CUSTOM:PERPAGE? ->
:DISPLAY:NUMERIC:CUSTOM:PERPAGE 5
```

Description The minimum number of items that can be displayed per page is "total number of display items (:DISPlay:NUMeric:CUSTom:TOTal)/12."

:DISPlay:NUMeric:CUSTom:TOTal

Function Sets or queries the total number of display items of the numeric display in custom display mode.

Syntax
```
:DISPlay:NUMeric:CUSTom:
TOTal {<NRf>}
:DISPlay:NUMeric:CUSTom:TOTal?
<NRf> = 1 to 192 (number of items)
```

Example
```
:DISPLAY:NUMERIC:CUSTOM:TOTAL 20
:DISPLAY:NUMERIC:CUSTOM:TOTAL? ->
:DISPLAY:NUMERIC:CUSTOM:TOTAL 20
```

Description The maximum number of total display items is "number of display items per page (:DISPlay:NUMeric:CUSTom:PERPage) × 12."

:DISPlay:NUMeric:FRAMe

Function Sets or queries the on/off status of the numeric display's data section frame.

Syntax
```
:DISPlay:NUMeric:FRAMe {<Boolean>}
:DISPlay:NUMeric:FRAMe?
```

Example
```
:DISPLAY:NUMERIC:FRAME ON
:DISPLAY:NUMERIC:FRAME? ->
:DISPLAY:NUMERIC:FRAME 1
```

:DISPlay:NUMeric:NORMal?

Function Queries all numeric display settings.

Syntax
```
:DISPlay:NUMeric:NORMal?
```

Description Returns all settings that correspond to the current numeric display mode (:DISPlay:NUMeric[:NORMal]:FORMat).

:DISPlay:NUMeric[:NORMal]:ALL?

Function Queries all settings of the numeric display in All Items display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:ALL?
```

:DISPlay:NUMeric[:NORMal]:ALL:COLumn?

Function Queries all column settings of the numeric display in All Items display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:ALL:
COLumn?
```

Description Column display settings are only valid on models that have five or more elements.

:DISPlay:NUMeric[:NORMal]:ALL:COLumn:DAELem

Function Sets or queries the on/off status of the column display all feature of the numeric display in All Items display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:ALL:
COLumn:DAELem {<Boolean>}
:DISPlay:NUMeric[:NORMal]:ALL:
COLumn:DAELem?
```

Example
```
:DISPLAY:NUMERIC:NORMAL:ALL:COLUMN:
DAELEM ON
:DISPLAY:NUMERIC:NORMAL:ALL:COLUMN:
DAELEM? ->
:DISPLAY:NUMERIC:NORMAL:ALL:COLUMN:
DAELEM 1
```

Description This feature (Display All Elements) automatically decreases the font size to display all columns when the number of columns that should be displayed exceeds 6 according to the wiring system setting (element/Σ).

:DISPlay:NUMeric[:NORMal]:ALL:COLumn:SCRoll

Function Sets or queries the on/off status of column scrolling of the numeric display in All Items display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:ALL:
COLumn:SCRoll {<NRf>}
:DISPlay:NUMeric[:NORMal]:ALL:
COLumn:SCRoll?
<NRf> = 0 to 3 (scroll amount)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:ALL:COLUMN:
SCROLL 0
:DISPLAY:NUMERIC:NORMAL:ALL:COLUMN:
SCROLL? ->
:DISPLAY:NUMERIC:NORMAL:ALL:COLUMN:
SCROLL 0
```

Description This command is valid when the column display all feature (:DISPlay:NUMeric[:NORMal]:ALL:COLumn:DAELem) is set to OFF.

:DISPlay:NUMeric[:NORMal]:ALL:CURSor

Function Sets or queries the cursor position on the numeric display in All Items display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:ALL:
CURSor {<Function>}
:DISPlay:NUMeric[:NORMal]:ALL:
CURSor?
<Function> = {URMS|IRMS|P|S|Q|...}
```

Example
```
:DISPLAY:NUMERIC:NORMAL:ALL:CURSOR P
:DISPLAY:NUMERIC:NORMAL:ALL:
CURSOR? ->
:DISPLAY:NUMERIC:NORMAL:ALL:CURSOR P
```

Description
- Use the function name to specify the cursor position.
- For information about the options available for <Function>, see Function Option List (1) on page 5-37.

:DISPlay:NUMeric[:NORMal]:ALL:ORDer

Function Sets or queries the displayed harmonic order on the harmonic measurement function display page of the numeric display in All Items display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:ALL:
ORDer {<Order>}
:DISPlay:NUMeric[:NORMal]:ALL:
ORDer?
<Order> = {TOTal|DC|<NRf>}
(<NRf> = 1 to 500)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:ALL:ORDER 1
:DISPLAY:NUMERIC:NORMAL:ALL:
ORDER? ->
:DISPLAY:NUMERIC:NORMAL:ALL:ORDER 1
```

Description
- This is only valid on models with the harmonic measurement (/G5 or /G6) option.
- This command is valid when the displayed page number (:DISPlay:NUMeric[:NORMal]:ALL:PAGE) of the numeric display in All Items display mode is 9 or 10.

:DISPlay:NUMeric[:NORMal]:ALL:PAGE

Function Sets or queries the displayed page of the numeric display in All Items display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:ALL:PAGE
{<NRf>}
:DISPlay:NUMeric[:NORMal]:ALL:PAGE?
<NRf> = 1 to 7 (page number)
<NRf> = 1 to 8 (when the delta
computation [/DT] option is
installed)
<NRf> = 1 to 12 (when the harmonic
measurement [/G5 or /G6] option is
installed)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:ALL:PAGE 1
:DISPLAY:NUMERIC:NORMAL:ALL:PAGE? ->
:DISPLAY:NUMERIC:NORMAL:ALL:PAGE 1
```

Description When the page number is set, the cursor position moves to the beginning of the page.

:DISPlay:NUMeric[:NORMal]:FORMat

Function Sets or queries the numeric display format.

Syntax
```
:DISPlay:NUMeric[:NORMal]:FORMat
{VAL4|VAL8|VAL16|MATRix|ALL|SINGle|
DUAL|CUSTom}
:DISPlay:NUMeric[:NORMal]:FORMat?
```

Example
```
:DISPLAY:NUMERIC:NORMAL:FORMAT VAL4
:DISPLAY:NUMERIC:NORMAL:FORMAT? ->
:DISPLAY:NUMERIC:NORMAL:FORMAT VAL4
```

Description
- The numeric data is displayed in the following ways for each format:
  {VAL4|VAL8|VAL16} = Numeric display items are displayed in order by their item numbers.(The numbers in these options indicate the number of items that are displayed on a single screen/page.)
  MATRix = Selected functions are displayed in order by element.
  ALL = All functions are displayed in order by element.
  SINGle = One list display item is listed by separating the data into even and odd harmonic orders.
  DUAL = Two list display items are listed in order by harmonic order.
  CUSTom = The specified numeric display items are displayed on the specified bitmap background.
- SINGle and DUAL can only be selected on models with the harmonic measurement (/G5 or /G6) option.

:DISPlay:NUMeric[:NORMal]:LIST?

Function Queries all numeric display settings in the list display modes.

Syntax
```
:DISPlay:NUMeric[:NORMal]:LIST?
```

Description The list display is only available on models with the harmonic measurement (/G5 or /G6) option.

:DISPlay:NUMeric[:NORMal]:LIST:CURSor

Function Sets or queries the cursor position on the numeric display in the list display modes.

Syntax
```
:DISPlay:NUMeric[:NORMal]:LIST:
CURSor {HEADer|ORDer}
:DISPlay:NUMeric[:NORMal]:LIST:
CURSor?
HEADer = The cursor moves to the
header section (data concerning all
the harmonics; left side of the
screen).
ORDer = The cursor moves to the
data section (numeric data of each
harmonic; right side of the screen).
```

Example
```
:DISPLAY:NUMERIC:NORMAL:LIST:
CURSOR ORDER
:DISPLAY:NUMERIC:NORMAL:LIST:
CURSOR? ->
:DISPLAY:NUMERIC:NORMAL:LIST:
CURSOR ORDER
```

:DISPlay:NUMeric[:NORMal]:LIST:HEADer

Function Sets or queries the cursor position of the header section on the numeric display in the list display modes.

Syntax
```
:DISPlay:NUMeric[:NORMal]:LIST:
HEADer {<NRf>}
:DISPlay:NUMeric[:NORMal]:LIST:
HEADer?
<NRf> = 1 to 155 (header row)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:LIST:
HEADER 1
:DISPLAY:NUMERIC:NORMAL:LIST:
HEADER? ->
:DISPLAY:NUMERIC:NORMAL:LIST:
HEADER 1
```

Description This command is valid when the cursor position (:DISPlay:NUMeric[:NORMal]:LIST:CURSor) on the numeric display in the list display modes is set to HEADer.

:DISPlay:NUMeric[:NORMal]:LIST:ITEM<x>

Function Sets or queries the specified display item (function and element) on the numeric display in the list display modes.

Syntax
```
:DISPlay:NUMeric[:NORMal]:LIST:
ITEM<x> {<Function>,<Element>}
:DISPlay:NUMeric[:NORMal]:LIST:
ITEM<x>?
<x> = 1 or 2 (item number)
<Function> = {U|I|P|S|Q|LAMBda|PHI|
PHIU|PHII|Z|RS|XS|RP|XP}
<Element> = {<NRf>|SIGMA|SIGMB|SIGMC}
(<NRf> = 1 to 6)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:LIST:
ITEM1 U,1
:DISPLAY:NUMERIC:NORMAL:LIST:
ITEM1? ->
:DISPLAY:NUMERIC:NORMAL:LIST:
ITEM1 U,1
```

Description For information about the options available for <Function>, see Function Option List (2) on page 5-40.

:DISPlay:NUMeric[:NORMal]:LIST:ORDer

Function Sets or queries the harmonic order cursor position of the data section on the numeric display in the list display modes.

Syntax
```
:DISPlay:NUMeric[:NORMal]:LIST:
ORDer {<NRf>}
:DISPlay:NUMeric[:NORMal]:LIST:
ORDer?
<NRf> = 1 to 500 (harmonic order)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:LIST:ORDER 1
:DISPLAY:NUMERIC:NORMAL:LIST:
ORDER? ->
:DISPLAY:NUMERIC:NORMAL:LIST:
ORDER 1
```

Description This command is valid when the cursor position (:DISPlay:NUMeric[:NORMal]:LIST:CURSor) on the numeric display in the list display modes is set to ORDer.

:DISPlay:NUMeric[:NORMal]:MATRix?

Function Queries all numeric display settings in matrix display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:MATRix?
```

:DISPlay:NUMeric[:NORMal]:MATRix:COLumn?

Function Queries all column settings of the numeric display in matrix display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:MATRix:
COLumn?
```

:DISPlay:NUMeric[:NORMal]:MATRix:COLumn:ITEM<x>

Function Sets or queries the specified column display item of the numeric display in matrix display mode.

Syntax
```
:DISPlay:NUMeric:[:NORMal]:MATRix:
COLumn:ITEM<x> {NONE|<Element>}
:DISPlay:NUMeric:[:NORMal]:MATRix:
COLumn:ITEM<x>?
<x> = 1 to 6 (column number)
<Element> = {<NRf>|SIGMA|SIGMB|
SIGMC}(<NRf> = 1 to 6)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:MATRIX:
COLUMN:ITEM1 1
:DISPLAY:NUMERIC:NORMAL:MATRIX:
COLUMN:ITEM1? ->
:DISPLAY:NUMERIC:NORMAL:MATRIX:
COLUMN:ITEM1 1
```

:DISPlay:NUMeric[:NORMal]:MATRix:COLumn:NUMber

Function Sets or queries the number of columns of the numeric display in matrix display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:MATRix:
COLumn:NUMber {<NRf>}
:DISPlay:NUMeric[:NORMal]:MATRix:
COLumn:NUMber?
<NRf> = 4, 6
```

Example
```
:DISPLAY:NUMERIC:NORMAL:MATRIX:
COLUMN:NUMBER 4
:DISPLAY:NUMERIC:NORMAL:MATRIX:
COLUMN:NUMBER? ->
:DISPLAY:NUMERIC:NORMAL:MATRIX:
COLUMN:NUMBER 4
```

:DISPlay:NUMeric[:NORMal]:MATRix:COLumn:RESet

Function Resets the column display items to their default values on the numeric display in matrix display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:MATRix:
COLumn:RESet
```

Example
```
:DISPLAY:NUMERIC:NORMAL:MATRIX:
COLUMN:RESET
```

:DISPlay:NUMeric[:NORMal]:MATRix:CURSor

Function Sets or queries the cursor position on the numeric display in matrix display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:MATRix:
CURSor {<NRf>}
:DISPlay:NUMeric[:NORMal]:MATRix:
CURSor?
<NRf> = 1 to 81 (item number)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:MATRIX:
CURSOR 1
:DISPLAY:NUMERIC:NORMAL:MATRIX:
CURSOR? ->
:DISPLAY:NUMERIC:NORMAL:MATRIX:
CURSOR 1
```

Description Use an item number to specify the cursor position.

:DISPlay:NUMeric[:NORMal]:MATRix:ITEM<x>

Function Sets or queries the specified display item (function and harmonic order) on the numeric display in matrix display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:MATRix:
ITEM<x> {NONE|<Function>[,<Element>]
[,<Order>]}
:DISPlay:NUMeric[:NORMal]:MATRix:
ITEM<x>?
<x> = 1 to 81 (item number)
NONE = No display item
<Function> = {URMS|IRMS|P|S|Q|...}
<Element> = {<NRf>|SIGMA|SIGMB|
SIGMC}(<NRf> = 1 to 6)
<Order> = {TOTal|DC|<NRf>}
(<NRf> = 1 to 500)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:MATRIX:
ITEM1 URMS
:DISPLAY:NUMERIC:NORMAL:MATRIX:
ITEM1? ->
:DISPLAY:NUMERIC:NORMAL:MATRIX:
ITEM1 URMS,1
:DISPLAY:NUMERIC:NORMAL:MATRIX:
ITEM1 UK,1,1
:DISPLAY:NUMERIC:NORMAL:MATRIX:
ITEM1? ->
:DISPLAY:NUMERIC:NORMAL:MATRIX:
ITEM1 UK,1,1
```

Description
- For information about the options available for <Function>, see Function Option List (1) on page 5-37.
- The <Element> setting has no effect on the display. If <Element> is omitted, the element is set to 1.
- If <Order> is omitted, the order is set to TOTal.
- <Element> and <Order> are omitted from responses to functions that do not need them.

:DISPlay:NUMeric[:NORMal]:MATRix:PAGE

Function Sets or queries the displayed page of the numeric display in matrix display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:MATRix:
PAGE {<NRf>}
:DISPlay:NUMeric[:NORMal]:MATRix:
PAGE?
<NRf> = 1 to 9 (page number)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:MATRIX:
PAGE 1
:DISPLAY:NUMERIC:NORMAL:MATRIX:
PAGE? ->
:DISPLAY:NUMERIC:NORMAL:MATRIX:
PAGE 1
```

Description When the page number is set, the cursor position moves to the beginning of the page.

:DISPlay:NUMeric[:NORMal]:MATRix:PRESet

Function Presets the display order pattern of displayed items on the numeric display in matrix display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:MATRix:
PRESet {<NRf>|EORigin|FORigin|
CLRPage|CLRAll}
<NRf> = 1 or EORigin (element
reference reset pattern; Element
Origin)
<NRf> = 2 or FORigin (function
reference reset pattern; Function
Origin)
<NRf> = 3 or CLRPage (clear the
display items of the current page;
Clear Current Page)
<NRf> = 4 or CLRAll (clear the
display items of all pages; Clear
All Pages)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:MATRIX:
PRESET 1
:DISPLAY:NUMERIC:NORMAL:MATRIX:
PRESET EORIGIN
```

Description The numeric display item display pattern (order) will be the same as the order when the displayed items are reset using the ITEM setup menu that is displayed on the WT1800 screen (Reset Items Exec). For details on the display pattern that appears when the displayed items are reset, see the getting started guide, IM WT1801-03EN.

:DISPlay:NUMeric[:NORMal]:{VAL4|VAL8|VAL16}?

Function Queries all numeric display settings in 4 Items, 8 Items, or 16 Items display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:
{VAL4|VAL8|VAL16}?
```

:DISPlay:NUMeric[:NORMal]:{VAL4|VAL8|VAL16}:CURSor

Function Sets or queries the cursor position on the numeric display in 4 Items, 8 Items, or 16 Items display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:
{VAL4|VAL8|VAL16}:CURSor {<NRf>}
:DISPlay:NUMeric[:NORMal]:
{VAL4|VAL8|VAL16}:CURSor?
<NRf> = 1 to 48 (item number; when
VAL4 is specified)
<NRf> = 1 to 96 (item number; when
VAL8 is specified)
<NRf> = 1 to 192 (item number; when
VAL16 is specified)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:VAL4:
CURSOR 1
:DISPLAY:NUMERIC:NORMAL:VAL4:
CURSOR? ->
:DISPLAY:NUMERIC:NORMAL:VAL4:
CURSOR 1
```

Description Use an item number to specify the cursor position.

:DISPlay:NUMeric[:NORMal]:{VAL4|VAL8|VAL16}:ITEM<x>

Function Sets or queries the function, element, and harmonic order of the specified numeric display item in 4 Items, 8 Items, or 16 Items display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:
{VAL4|VAL8|VAL16}:ITEM<x>
{NONE|<Function>[,<Element>]
[,<Order>]}
:DISPlay:NUMeric[:NORMal]:
{VAL4|VAL8|VAL16}:ITEM<x>?
<x> = 1 to 48 (item number; when
VAL4 is specified)
<x> = 1 to 96 (item number; when
VAL8 is specified)
<x> = 1 to 192 (item number; when
VAL16 is specified)
NONE = No display item
<Function> = {URMS|IRMS|P|S|Q|...}
<Element> = {<NRf>|SIGMA|SIGMB|
SIGMC}(<NRf> = 1 to 6)
<Order> = {TOTal|DC|<NRf>}
(<NRf> = 1 to 500)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:VAL4:
ITEM1 URMS,1
:DISPLAY:NUMERIC:NORMAL:VAL4:
ITEM1? ->
:DISPLAY:NUMERIC:NORMAL:VAL4:
ITEM1 URMS,1
:DISPLAY:NUMERIC:NORMAL:VAL4:
ITEM1 UK,1,1
:DISPLAY:NUMERIC:NORMAL:VAL4:
ITEM1? ->
:DISPLAY:NUMERIC:NORMAL:VAL4:
ITEM1 UK,1,1
```

Description
- For information about the options available for <Function>, see Function Option List (1) on page 5-37.
- If <Element> is omitted, the element is set to 1.
- If <Order> is omitted, the order is set to TOTal.
- <Element> and <Order> are omitted from responses to functions that do not need them.

:DISPlay:NUMeric[:NORMal]:{VAL4|VAL8|VAL16}:PAGE

Function Sets or queries the displayed page of the numeric display in 4 Items, 8 Items, or 16 Items display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:
{VAL4|VAL8|VAL16}:PAGE {<NRf>}
:DISPlay:NUMeric[:NORMal]:
{VAL4|VAL8|VAL16}:PAGE?
<NRf> = 1 to 12 (page number)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:VAL4:PAGE 1
:DISPLAY:NUMERIC:NORMAL:VAL4:
PAGE? -> :DISPLAY:NUMERIC:NORMAL:
VAL4:PAGE 1
```

Description When the page number is set, the cursor position moves to the beginning of the page.

:DISPlay:NUMeric[:NORMal]:{VAL4|VAL8|VAL16}:PRESet

Function Presets the display order pattern of displayed items on the numeric display in 4 Items, 8 Items, or 16 Items display mode.

Syntax
```
:DISPlay:NUMeric[:NORMal]:
{VAL4|VAL8|VAL16}:PRESet {<NRf>|
EORigin|FORigin|CLRPage|CLRAll}
<NRf> = 1 or EORigin (element
reference reset pattern; Element
Origin)
<NRf> = 2 or FORigin (function
reference reset pattern; Function
Origin)
<NRf> = 3 or CLRPage (clear the
display items of the current page;
Clear Current Page)
<NRf> = 4 or CLRAll (clear the
display items of all pages; Clear
All Pages)
```

Example
```
:DISPLAY:NUMERIC:NORMAL:VAL4:
PRESET 1
:DISPLAY:NUMERIC:NORMAL:VAL4:
PRESET EORIGIN
```

Description The numeric display item display pattern (order) will be the same as the order when the displayed items are reset using the ITEM setup menu that is displayed on the WT1800 screen (Reset Items Exec). For details on the display pattern that appears when the displayed items are reset, see the getting started guide, IM WT1801-03EN.

:DISPlay:TRENd?

Function Queries all trend display settings.

Syntax
```
:DISPlay:TRENd?
```

:DISPlay:TRENd:ALL

Function Collectively sets the on/off status of all trends.

Syntax
```
:DISPlay:TRENd:ALL {<Boolean>}
```

Example
```
:DISPLAY:TREND:ALL ON
```

:DISPlay:TRENd:CLEar

Function Clears all trends.

Syntax
```
:DISPlay:TRENd:CLEar
```

Example
```
:DISPLAY:TREND:CLEAR
```

:DISPlay:TRENd:FORMat

Function Sets or queries the display format of all trends.

Syntax
```
:DISPlay:TRENd:FORMat {SINGle|DUAL|
TRIad|QUAD}
:DISPlay:TRENd:FORMat?
```

Example
```
:DISPLAY:TREND:FORMAT SINGLE
:DISPLAY:TREND:FORMAT? ->
:DISPLAY:TREND:FORMAT SINGLE
```

:DISPlay:TRENd:ITEM<x>?

Function Queries all settings for the specified trend.

Syntax
```
:DISPlay:TRENd:ITEM<x>?
<x> = 1 to 16 (item number)
```

:DISPlay:TRENd:ITEM<x>[:FUNCtion]

Function Sets or queries the function, element, and harmonic order of the specified trend item.

Syntax
```
:DISPlay:TRENd:ITEM<x>[:FUNCtion]
{<Function>,<Element>[,<Order>]}
:DISPlay:TRENd:ITEM<x>:FUNCtion?
<x> = 1 to 16 (item number)
<Function> = {URMS|IRMS|P|S|Q|...}
<Element> = {<NRf>|SIGMA|SIGMB|
SIGMC}(<NRf> = 1 to 6)
<Order> = {TOTal|DC|<NRf>}
(<NRf> = 1 to 500)
```

Example
```
:DISPLAY:TREND:ITEM1:FUNCTION URMS,1
:DISPLAY:TREND:ITEM1:FUNCTION? ->
:DISPLAY:TREND:ITEM1:FUNCTION URMS,1
:DISPLAY:TREND:ITEM1:FUNCTION UK,1,1
:DISPLAY:TREND:ITEM1:FUNCTION? ->
:DISPLAY:TREND:ITEM1:FUNCTION UK,1,1
```

Description
- For information about the options available for <Function>, see Function Option List (1) on page 5-37.
- If <Element> is omitted, the element is set to 1.
- If <Order> is omitted, the order is set to TOTal.
- <Element> and <Order> are omitted from responses to functions that do not need them.

:DISPlay:TRENd:ITEM<x>:SCALing?

Function Queries all scaling settings for the specified trend.

Syntax
```
:DISPlay:TRENd:ITEM<x>:SCALing?
<x> = 1 to 16 (item number)
```

:DISPlay:TRENd:ITEM<x>:SCALing:MODE

Function Sets or queries the scaling mode of the specified trend.

Syntax
```
:DISPlay:TRENd:ITEM<x>:SCALing:MODE
{AUTO|MANual}
:DISPlay:TRENd:ITEM<x>:SCALing:MODE?
<x> = 1 to 16 (item number)
```

Example
```
:DISPLAY:TREND:ITEM1:SCALING:
MODE AUTO
:DISPLAY:TREND:ITEM1:SCALING:
MODE? ->
:DISPLAY:TREND:ITEM1:SCALING:
MODE AUTO
```

:DISPlay:TRENd:ITEM<x>:SCALing:VALue

Function Sets or queries the upper and lower limits of the manual scaling of the specified trend.

Syntax
```
:DISPlay:TRENd:ITEM<x>:SCALing:
VALue {<NRf>,<NRf>}
:DISPlay:TRENd:ITEM<x>:SCALing:
VALue?
<x> = 1 to 16 (item number)
<NRf> = -9.999E+12 to 9.999E+12
```

Example
```
:DISPLAY:TREND:ITEM1:SCALING:
VALUE 100,-100
:DISPLAY:TREND:ITEM1:SCALING:
VALUE? ->
:DISPLAY:TREND:ITEM1:SCALING:
VALUE 100.0E+00,-100.0E+00
```

Description
- Set the upper limit and then the lower limit.
- This command is valid when the scaling mode of the trend (:DISPlay:TRENd:ITEM<x>:SCALing:MODE) is set to MANual.

:DISPlay:TRENd:T<x>

Function Sets or queries the on/off status of the specified trend.

Syntax
```
:DISPlay:TRENd:T<x> {<Boolean>}
:DISPlay:TRENd:T<x>?
<x> = 1 to 16 (item number)
```

Example
```
:DISPLAY:TREND:T1 ON
:DISPLAY:TREND:T1? ->}
:DISPLAY:TREND:T1 1
```

:DISPlay:TRENd:TDIV

Function Sets or queries the trend horizontal axis (T/div).

Syntax
```
:DISPlay:TRENd:TDIV {<NRf>,<NRf>,
<NRf>}
:DISPlay:TRENd:TDIV?
{<NRf>,<NRf>,<NRf>} = 0, 0, 3 to
24, 0, 0
First <NRf> = 1, 3, 6, 12, 24 (hours)
Second <NRf> = 1, 3, 6, 10, 30
(minutes)
Third <NRf> = 3, 6, 10, 30 (seconds)
```

Example
```
:DISPLAY:TREND:TDIV 0,0,3
:DISPLAY:TREND:TDIV? ->
:DISPLAY:TREND:TDIV 0,0,3
```

Description Set the three <NRf>'s so that one <NRf> is a non-zero value and the other two are zero.

:DISPlay:VECTor?

Function Queries all vector display settings.

Syntax
```
:DISPlay:VECTor?
```

Description The vector display is only available on models with the harmonic measurement (/G5 or /G6) option.

:DISPlay:VECTor:FORMat

Function Sets or queries the display format of all vectors.

Syntax
```
:DISPlay:VECTor:FORMat {SINGle|DUAL}
:DISPlay:VECTor:FORMat?
```

Example
```
:DISPLAY:VECTOR:FORMAT SINGLE
:DISPLAY:VECTOR:FORMAT? ->
:DISPLAY:VECTOR:FORMAT SINGLE
```

:DISPlay:VECTor:ITEM<x>?

Function Queries all settings for the specified vector.

Syntax
```
:DISPlay:VECTor:ITEM<x>?
<x> = 1 or 2 (item number)
```

:DISPlay:VECTor:ITEM<x>:OBJect

Function Sets or queries the wiring unit that is displayed using the specified vector.

Syntax
```
:DISPlay:VECTor:ITEM<x>:
OBJect {<Element>}
:DISPlay:VECTor:ITEM<x>:OBJect?
<x> = 1 or 2 (item number)
<Element> = {<NRf>|SIGMA|SIGMB|
SIGMC}(<NRf> = 1 to 6)
```

Example
```
:DISPLAY:VECTOR:ITEM1:OBJECT SIGMA
:DISPLAY:VECTOR:ITEM1:OBJECT? ->
:DISPLAY:VECTOR:ITEM1:OBJECT SIGMA
```

:DISPlay:VECTor:ITEM<x>:{UMAG|IMAG}

Function Sets or queries the voltage or current zoom factor for the vector display.

Syntax
```
:DISPlay:VECTor:ITEM<x>:{UMAG|IMAG}
{<NRf>}
:DISPlay:VECTor:ITEM<x>:{UMAG|IMAG}?
<x> = 1 or 2 (item number)
<NRf> = 0.100 to 100.000
```

Example
```
:DISPLAY:VECTOR:ITEM1:UMAG 1
:DISPLAY:VECTOR:ITEM1:UMAG? ->
:DISPLAY:VECTOR:ITEM1:UMAG 1.000
```

:DISPlay:VECTor:NUMeric

Function Sets or queries the on/off status of the numeric data display on the vector display.

Syntax
```
:DISPlay:VECTor:NUMeric {<Boolean>}
:DISPlay:VECTor:NUMeric?
```

Example
```
:DISPLAY:VECTOR:NUMERIC ON
:DISPLAY:VECTOR:NUMERIC? ->
:DISPLAY:VECTOR:NUMERIC 1
```

:DISPlay:WAVE?

Function Queries all waveform display settings.

Syntax
```
:DISPlay:WAVE?
```

:DISPlay:WAVE:ALL

Function Collectively sets the on/off status of all waveform displays.

Syntax
```
:DISPlay:WAVE:ALL {<Boolean>}
```

Example
```
:DISPLAY:WAVE:ALL ON
```

:DISPlay:WAVE:FORMat

Function Sets or queries the display format of all waveforms.

Syntax
```
:DISPlay:WAVE:FORMat {SINGle|DUAL|
TRIad|QUAD|HEXa}
:DISPlay:WAVE:FORMat?
```

Example
```
:DISPLAY:WAVE:FORMAT SINGLE
:DISPLAY:WAVE:FORMAT? ->
:DISPLAY:WAVE:FORMAT SINGLE
```

:DISPlay:WAVE:GRATicule

Function Sets or queries the graticule (grid) type.

Syntax
```
:DISPlay:WAVE:GRATicule {GRID|FRAMe|
CROSshair}
:DISPlay:WAVE:GRATicule?
```

Example
```
:DISPLAY:WAVE:GRATICULE GRID
:DISPLAY:WAVE:GRATICULE? ->
:DISPLAY:WAVE:GRATICULE GRID
```

:DISPlay:WAVE:INTerpolate

Function Sets or queries the waveform interpolation method.

Syntax
```
:DISPlay:WAVE:INTerpolate {OFF|LINE}
:DISPlay:WAVE:INTerpolate?
```

Example
```
:DISPLAY:WAVE:INTERPOLATE LINE
:DISPLAY:WAVE:INTERPOLATE? ->
:DISPLAY:WAVE:INTERPOLATE LINE
```

:DISPlay:WAVE:MAPPing?

Function Queries all split screen waveform mapping settings.

Syntax
```
:DISPlay:WAVE:MAPPing?
```

:DISPlay:WAVE:MAPPing[:MODE]

Function Sets or queries the split screen waveform mapping mode.

Syntax
```
:DISPlay:WAVE:MAPPing[:MODE]
{AUTO|FIXed|USER}
:DISPlay:WAVE:MAPPing:MODE?
```

Example
```
:DISPLAY:WAVE:MAPPING:MODE AUTO
:DISPLAY:WAVE:MAPPING:MODE? ->
:DISPLAY:WAVE:MAPPING:MODE AUTO
```

:DISPlay:WAVE:MAPPing:{U<x>|I<x>|SPEed|TORQue|AUX<x>}

Function Sets or queries the split screen voltage, current, rotating speed, torque, or auxiliary signal waveform mapping setting.

Syntax
```
:DISPlay:WAVE:MAPPing:{U<x>|I<x>|
SPEed|TORQue|AUX<x>} {<NRf>}
:DISPlay:WAVE:MAPPing:{U<x>|I<x>|
SPEed|TORQue|AUX<x>}?
U<x> and I<x>'s <x> = 1 to 6 (element)
AUX<x>'s <x> = 1 or 2 (AUX input
channel)
<NRf> = 0 to 5
```

Example
```
:DISPLAY:WAVE:MAPPING:U1 0
:DISPLAY:WAVE:MAPPING:U1? ->
:DISPLAY:WAVE:MAPPING:U1 0
```

Description
- This command is valid when the waveform mapping method (:DISPlay:WAVE:MAPPing[:MODE]) is set to USER.
- SPEed and TORQue are only valid on models with the motor evaluation function (/MTR) option.
- AUX<x> is only valid on models with the auxiliary input (/AUX) option.

:DISPlay:WAVE:POSition?

Function Queries all waveform vertical position (center position level) settings.

Syntax
```
:DISPlay:WAVE:POSition?
```

:DISPlay:WAVE:POSition:{U<x>|I<x>}

Function Sets or queries the vertical position (center position level) of the specified element's voltage or current waveform.

Syntax
```
:DISPlay:WAVE:POSition:{U<x>|I<x>}
{<NRf>}
:DISPlay:WAVE:POSition:{U<x>|I<x>}?
<x> = 1 to 6 (element)
<NRf> = -130.000 to 130.000(%)
```

Example
```
:DISPLAY:WAVE:POSITION:U1 0
:DISPLAY:WAVE:POSITION:U1? ->
:DISPLAY:WAVE:POSITION:U1 0.000
```

:DISPlay:WAVE:POSition:{UALL|IALL}

Function Collectively sets the vertical positions (center position levels) of the voltage or current waveforms of all elements.

Syntax
```
:DISPlay:WAVE:POSition:{UALL|IALL}
{<NRf>}
<NRf> = -130.000 to 130.000(%)
```

Example
```
:DISPLAY:WAVE:POSITION:UALL 0
```

:DISPlay:WAVE:SVALue

Function Sets or queries the on/off status of the scale value display.

Syntax
```
:DISPlay:WAVE:SVALue {<Boolean>}
:DISPlay:WAVE:SVALue?
```

Example
```
:DISPLAY:WAVE:SVALUE ON
:DISPLAY:WAVE:SVALUE? ->
:DISPLAY:WAVE:SVALUE 1
```

:DISPlay:WAVE:TDIV

Function Sets or queries the waveform Time/div value.

Syntax
```
:DISPlay:WAVE:TDIV {<Time>}
:DISPlay:WAVE:TDIV?
<Time> = 0.05, 0.1, 0.2, 0.5, 1, 2, 5,
10, 20, 50, 100, 200, 500 (ms), 1, 2 (s)
```

Example
```
:DISPLAY:WAVE:TDIV 5MS
:DISPLAY:WAVE:TDIV? ->
:DISPLAY:WAVE:TDIV 5.00E-03
```

Description The specifiable Time/div value is up to 1/10 of the data update rate (:RATE).

:DISPlay:WAVE:TLABel

Function Sets or queries the on/off status of the waveform labels.

Syntax
```
:DISPlay:WAVE:TLABel {<Boolean>}
:DISPlay:WAVE:TLABel?
```

Example
```
:DISPLAY:WAVE:TLABEL OFF
:DISPLAY:WAVE:TLABEL? ->
:DISPLAY:WAVE:TLABEL 0
```

:DISPlay:WAVE:TRIGger?

Function Queries all trigger settings.

Syntax
```
:DISPlay:WAVE:TRIGger?
```

:DISPlay:WAVE:TRIGger:LEVel

Function Sets or queries the trigger level.

Syntax
```
:DISPlay:WAVE:TRIGger:LEVel {<NRf>}
:DISPlay:WAVE:TRIGger:LEVel?
<NRf> = -100.0 to 100.0(%)
```

Example
```
:DISPLAY:WAVE:TRIGGER:LEVEL 0
:DISPLAY:WAVE:TRIGGER:LEVEL? ->
:DISPLAY:WAVE:TRIGGER:LEVEL 0.0
```

Description Set the value in terms of a percentage of the full scale value displayed on the screen.

:DISPlay:WAVE:TRIGger:MODE

Function Sets or queries the trigger mode.

Syntax
```
:DISPlay:WAVE:TRIGger:MODE
{AUTO|NORMal|OFF}
:DISPlay:WAVE:TRIGger:MODE?
```

Example
```
:DISPLAY:WAVE:TRIGGER:MODE AUTO
:DISPLAY:WAVE:TRIGGER:MODE? ->
:DISPLAY:WAVE:TRIGGER:MODE AUTO
```

:DISPlay:WAVE:TRIGger:SLOPe

Function Sets or queries the trigger slope.

Syntax
```
:DISPlay:WAVE:TRIGger:SLOPe
{RISE|FALL|BOTH}
:DISPlay:WAVE:TRIGger:SLOPe?
```

Example
```
:DISPLAY:WAVE:TRIGGER:SLOPE RISE
:DISPLAY:WAVE:TRIGGER:SLOPE? ->
:DISPLAY:WAVE:TRIGGER:SLOPE RISE
```

:DISPlay:WAVE:TRIGger:SOURce

Function Sets or queries the trigger source.

Syntax
```
:DISPlay:WAVE:TRIGger:SOURce
{U<x>|I<x>|EXTernal}
:DISPlay:WAVE:TRIGger:SOURce?
<x> = 1 to 6 (element)
EXTernal = External trigger input (Ext
Clk)
```

Example
```
:DISPLAY:WAVE:TRIGGER:SOURCE U1
:DISPLAY:WAVE:TRIGGER:SOURCE? ->
:DISPLAY:WAVE:TRIGGER:SOURCE U1
```

:DISPlay:WAVE:{U<x>|I<x>|SPEed|TORQue|AUX<x>}

Function Sets or queries the on/off status of the voltage, current, rotating speed, torque, or auxiliary signal waveform display.

Syntax
```
:DISPlay:WAVE:{U<x>|I<x>|SPEed|
TORQue|AUX<x>} {<Boolean>}
:DISPlay:WAVE:{U<x>|I<x>|SPEed|
TORQue|AUX<x>}?
U<x> and I<x>'s <x> = 1 to 6 (element)
AUX<x>'s <x> = 1 or 2 (AUX input
channel)
```

Example
```
:DISPLAY:WAVE:U1 ON
:DISPLAY:WAVE:U1? ->
:DISPLAY:WAVE:U1 1
```

Description
- SPEed and TORQue are only valid on models with the motor evaluation function (/MTR) option.
- AUX<x> is only valid on models with the auxiliary input (/AUX) option.

:DISPlay:WAVE:VZoom?

Function Queries all waveform vertical zoom factor settings.

Syntax
```
:DISPlay:WAVE:VZoom?
```

:DISPlay:WAVE:VZoom:{U<x>|I<x>}

Function Sets or queries the vertical zoom factor of the specified element's voltage or current waveform.

Syntax
```
:DISPlay:WAVE:VZoom:{U<x>|I<x>}
{<NRf>}
:DISPlay:WAVE:VZoom:{U<x>|I<x>}?
<x> = 1 to 6 (element)
<NRf> = 0.1 to 100
```

Example
```
:DISPLAY:WAVE:VZOOM:U1 1
:DISPLAY:WAVE:VZOOM:U1? ->
:DISPLAY:WAVE:VZOOM:U1 1.00
```

Description For details on the available zoom factors, see the features guide, IM WT1801-01EN.

:DISPlay:WAVE:VZoom:{UALL|IALL}

Function Collectively sets the vertical zoom factor for the voltage or current waveforms of all elements.

Syntax
```
:DISPlay:WAVE:VZoom:{UALL|IALL}
{<NRf>}
<NRf> = 0.1 to 100
```

Example
```
:DISPLAY:WAVE:VZOOM:UALL 1
```

Description For details on the available zoom factors, see the features guide, IM WT1801-01EN.

*** Function Option List (Settings That Can Be Used for <Function>)**

(1)Numeric data functions

Applicable commands

```
:AOUTput[:NORMal]:CHANnel<x> {NONE|<Function>[,<Element>][,<Order>]}
:DISPlay:NUMeric:CUSTom:ITEM<x>[:FUNCtion] {<Function>[,<Element>]
[,<Order>]|<String>}
:DISPlay:NUMeric[:NORMal]:{VAL4|VAL8|VAL16}:ITEM<x> {NONE|<Function>
[,<Element>][,<Order>]}
:DISPlay:NUMeric[:NORMal]:MATRix:ITEM<x> {NONE|<Function>[,<Element>]
[,<Order>]}
:DISPlay:NUMeric[:NORMal]:ALL:CURSor {<Function>}
:DISPlay:TRENd:ITEM<x>[:FUNCtion] {<Function>,<Element>[,<Order>]}
:FILE:SAVE:NUMeric:NORMal:<Function> {<Boolean>}
:MEASure:EVENt<x>:EXPRession:ITEM {<Function>[,<Element>][,<Order>]}
:NUMeric[:NORMal]:ITEM<x> {NONE|<Function>[,<Element>][,<Order>]}
:STORe:NUMeric[:NORMal]:<Function> {<Boolean>}
```

<Function>	Function Name Used on the Menu (Numeric display header name)	<Element>	<Order>
URMS	Urms	Required	Not required
UMN	Umn	Required	Not required
UDC	Udc	Required	Not required
URMN	Urmn	Required	Not required
UAC	Uac	Required	Not required
IRMS	Irms	Required	Not required
IMN	Imn	Required	Not required
IDC	Idc	Required	Not required
IRMN	Irmn	Required	Not required
IAC	Iac	Required	Not required
P	P	Required	Not required
S	S	Required	Not required
Q	Q	Required	Not required
LAMBda	λ	Required	Not required
PHI	φ	Required	Not required
FU	FreqU(fU)	Required	Not required
FI	FreqI(fI)	Required	Not required
UPPeak	U+peak(U+pk)	Required	Not required
UMPeak	U-peak(U-pk)	Required	Not required
IPPeak	I+peak(I+pk)	Required	Not required
IMPeak	I-peak(I-pk)	Required	Not required
CFU	CfU	Required	Not required
CFI	CfI	Required	Not required
PC	Pc	Required	Not required
PPPeak	P+peak(P+pk)	Required	Not required
PMPeak	P-peak(P-pk)	Required	Not required
TIME	Time	Required	Not required
WH	WP	Required	Not required
WHP	WP+	Required	Not required
WHM	WP-	Required	Not required
AH	q	Required	Not required
AHP	q+	Required	Not required
AHM	q-	Required	Not required
WS	WS	Required	Not required
WQ	WQ	Required	Not required
ETA1 to ETA4	η1 to η4	Not required	Not required
F1 to F20	F1 to F20	Not required	Not required
EV1 to EV8	Event1 to Event8	Not required	Not required

Functions That Require the Harmonic Measurement (/G5 or /G6) Option			
UK	U(k)	Required	Required
IK	I(k)	Required	Required
PK	P(k)	Required	Required
SK	S(k)	Required	Required
QK	Q(k)	Required	Required
LAMBDAK	λ(k)	Required	Required
PHIK	φ(k)	Required	Required
PHIUk	φU(k)	Required	Required
PHIIk	φI(k)	Required	Required
Zk	Z(k)	Required	Required
RSk	Rs(k)	Required	Required
XSk	Xs(k)	Required	Required
RPk	Rp(k)	Required	Required
XPk	Xp(k)	Required	Required
UHDFk	Uhdf(k)	Required	Required
IHDFk	Ihdf(k)	Required	Required
PHDFk	Phdf(k)	Required	Required
UTHD	Uthd	Required	Not required
ITHD	Ithd	Required	Not required
PTHD	Pthd	Required	Not required
UTHF	Uthf	Required	Not required
ITHF	Ithf	Required	Not required
UTIF	Utif	Required	Not required
ITIF	Itif	Required	Not required
HVF	hvf	Required	Not required
HCF	hcf	Required	Not required
KFACtor	K-factor	Required	Not required
PHI_U1U2	φUi-Uj	Required	Not required
PHI_U1U3	φUi-Uk	Required	Not required
PHI_U1I1	φUi-Ii	Required	Not required
PHI_U2I2	φUj-Ij	Required	Not required
PHI_U3I3	φUj-Ik	Required	Not required
FPLL1	fPLL1	Not required	Not required
FPLL2	fPLL2	Not required	Not required

Functions That Require the Delta Computation (/DT) Option			
DU1	ΔU1	Required (only Σ)	Not required
DU2	ΔU2	Required (only Σ)	Not required
DU3	ΔU3	Required (only Σ)	Not required
DUS	ΔUΣ	Required (only Σ)	Not required
DI	ΔI	Required (only Σ)	Not required
DP1	ΔP1	Required (only Σ)	Not required
DP2	ΔP2	Required (only Σ)	Not required
DP3	ΔP3	Required (only Σ)	Not required
DPS	ΔPΣ	Required (only Σ)	Not required
Functions That Require the Motor Evaluation Function (/MTR) Option			
SPEed	Speed	Not required	Not required
TORQue	Torque	Not required	Not required
SYNCsp	SyncSp	Not required	Not required
SLIP	Slip	Not required	Not required
PM	Pm	Not required	Not required
EAU	EaU	Required	Not required
EAI	EaI	Required	Not required
Functions That Require the Auxiliary Input (/AUX) Option			
AUX1	Aux1	Not required	Not required
AUX2	Aux2	Not required	Not required

Note

- For functions in the list above that do not require the element to be specified but whose commands have a parameter for specifying the element (<Element>), omit the parameter or set it to 1.
- Likewise, for functions in the list above that do not require the harmonic order to be specified but whose commands have a parameter for specifying the harmonic order (<Order>), omit the parameter or set it to TOTal.

(2) Numeric list data functions (these functions require the harmonic measurement option)

Applicable commands

```
:DISPlay:BAR:ITEM<x>[:FUNCtion] {<Function>,<Element>}
:DISPlay:NUMeric[:NORMal]:LIST:ITEM<x> {<Function>,<Element>}
:NUMeric:LIST:ITEM<x> {NONE|<Function>,<Element>}
```

<Function>	Function Name Used on the Menu
U	U
I	I
P	P
S	S
Q	Q
LAMBda	λ
PHI	φ
PHIU	φU
PHII	φI
Z	Z
RS	Rs
XS	Xs
RP	Rp
XP	Xp
The function options listed below are only valid with :NUMeric:LIST:ITEM<x>.	
UHDF	Uhdf
IHDF	Ihdf
PHDF	Phdf

5.7 FILE Group

The commands in this group deal with file operations.
You can perform the same operations and make the same settings and queries that you can make by pressing FILE on the front panel.

:FILE?
Function Queries all file operation settings.
Syntax :FILE?

:FILE:CDIRectory
Function Changes the current directory.
Syntax :FILE:CDIRectory {<String>}
<String> = Directory name
Example :FILE:CDIRECTORY "TEST"
Description Specify ".." to move up to the parent directory.

:FILE:DELete:IMAGe:{BMP|PNG|JPEG}
Function Deletes the specified screen image data file.
Syntax :FILE:DELete:IMAGe:
{BMP|PNG|JPEG} {<String>}
<String> = File name
Example :FILE:DELETE:IMAGE:BMP "IMAGE1"
Description Specify the file name without an extension.

:FILE:DELete:NUMeric:ASCii
Function Deletes the specified numeric data file.
Syntax :FILE:DELete:NUMeric:
ASCii {<String>}
<String> = File name
Example :FILE:DELETE:NUMERIC:ASCII "NUM1"
Description Specify the file name without an extension.

:FILE:DELete:SETup
Function Deletes the specified setup parameter file.
Syntax :FILE:DELete:SETup {<String>}
<String> = File name
Example :FILE:DELETE:SETUP "SETUP1"
Description Specify the file name without an extension.

:FILE:DELete:STORe:{DATA|HEADer}
Function Deletes the specified stored numeric data file.
Syntax :FILE:DELete:STORe:{DATA|
HEADer}{<String>}
<String> = File name
Example :FILE:DELETE:STORE:DATA "STR1"
Description Specify the file name without an extension.

:FILE:DELete:WAVE:ASCii
Function Deletes the specified waveform display data file.
Syntax :FILE:DELete:WAVE:ASCii {<String>}
<String> = File name
Example :FILE:DELETE:WAVE:ASCII "WAVE1"
Description Specify the file name without an extension.

:FILE:DRIVe
Function Sets the current drive.
Syntax :FILE:DRIVe {RAM|USB[,<NRf>]|NETWork}
RAM = Built-in RAM drive
USB = USB memory device drive
<NRf> = 0 or 1 (drive number)
NETWork = Network drive
Example :FILE:DRIVE RAM

:FILE:FILTer
Function Sets or queries the file list filter.
Syntax :FILE:FILTer {ALL|ITEM}
:FILE:FILTer?
Example :FILE:FILTER ALL
:FILE:FILTER? ->
:FILE:FILTER ALL

:FILE:FREE?
Function Queries the free space (in bytes) on the current drive.
Syntax :FILE:FREE?
Example :FILE:FREE? -> 20912128

:FILE:LOAD:ABORt
Function Aborts a file loading operation.
Syntax :FILE:LOAD:ABORt
Example :FILE:LOAD:ABORT

:FILE:LOAD:SETup
Function Loads the specified setup parameter file.
Syntax :FILE:LOAD:SETup {<String>}
<String> = File name
Example :FILE:LOAD:SETUP "SETUP1"
Description • Specify the file name without an extension.
• This command is an overlap command.

:FILE:PATH?
Function Queries the absolute path of the current directory.
Syntax :FILE:PATH?
Example :FILE:PATH? -> "USB-0/TEST"

:FILE:SAVE?
Function Queries all file save settings.
Syntax :FILE:SAVE?

:FILE:SAVE:ABORt
Function Aborts a file saving operation.
Syntax :FILE:SAVE:ABORt
Example :FILE:SAVE:ABORT

:FILE:SAVE:ANAMing
Function Sets or queries the auto naming feature for saving files.
Syntax :FILE:SAVE:ANAMing {OFF|NUMBering|DATE}
:FILE:SAVE:ANAMing?
Example :FILE:SAVE:ANAMING NUMBERING
:FILE:SAVE:ANAMING? ->
:FILE:SAVE:ANAMING NUMBERING

:FILE:SAVE:COMMent
Function Sets or queries the comment that will be added to files that are saved.
Syntax :FILE:SAVE:COMMent {<String>}
:FILE:SAVE:COMMent?
<String> = Up to 30 characters
Example :FILE:SAVE:COMMENT "CASE1"
:FILE:SAVE:COMMENT? ->
:FILE:SAVE:COMMENT "CASE1"

:FILE:SAVE:NUMeric[:EXECute]
Function Saves numeric data to a file.
Syntax :FILE:SAVE:NUMeric[:EXECute] {<String>}
<String> = File name
Example :FILE:SAVE:NUMERIC:EXECUTE "NUM1"
Description • Specify the file name without an extension.
• This command is an overlap command.

:FILE:SAVE:NUMeric:ITEM
Function Sets or queries the method that is used to select which items are saved when numeric data is saved to a file.
Syntax :FILE:SAVE:NUMeric:ITEM {DISPlayed|SELected}
:FILE:SAVE:NUMeric:ITEM?
DISPlayed = Automatic selection method in which all the items that are displayed on the screen are selected
SELected = Manual selection method
Example :FILE:SAVE:NUMERIC:ITEM SELECTED
:FILE:SAVE:NUMERIC:ITEM? ->
:FILE:SAVE:NUMERIC:ITEM SELECTED
Description The available options are explained below.
DISPlayed = The numeric items that are displayed on the screen are saved to the file.
SELected = The numeric items that are specified with the commands that start with ":FILE:SAVE:NUMeric:NORMal: . . ." are saved to the file.

:FILE:SAVE:NUMeric:NORMal?
Function Queries all numeric data file save settings (for the manual save item selection method).
Syntax :FILE:SAVE:NUMeric:NORMal?
Description This command is valid when the save item selection method (:FILE:SAVE:NUMeric:ITEM) is set to SELected (the manual selection method).

:FILE:SAVE:NUMeric:NORMal:ALL
Function Collectively sets the on/off status of the output of all element functions when numeric data is saved to a file.
Syntax :FILE:SAVE:NUMeric:NORMal:ALL {<Boolean>}
Example :FILE:SAVE:NUMERIC:NORMAL:ALL ON

:FILE:SAVE:NUMeric:NORMal:{ELEMent<x>|SIGMA|SIGMB|SIGMC}
Function Sets or queries the on/off status of the output of the specified element or wiring unit ΣA, ΣB, or ΣC when numeric data is saved to a file.
Syntax :FILE:SAVE:NUMeric:NORMal:{ELEMent<x>|SIGMA|SIGMB|SIGMC} {<Boolean>}
:FILE:SAVE:NUMeric:NORMal:{ELEMent<x>|SIGMA|SIGMB|SIGMC}?
<x> = 1 to 6
Example :FILE:SAVE:NUMERIC:NORMAL:ELEMENT1 ON
:FILE:SAVE:NUMERIC:NORMAL:ELEMENT1? ->
:FILE:SAVE:NUMERIC:NORMAL:ELEMENT1 1
Description SIGMA, SIGMB, or SIGMC is invalid if the wiring system setting ([:INPut]:WIRing) is made in such a way that the corresponding wiring unit (ΣA, ΣB, or ΣC) does not exist.

:FILE:SAVE:NUMeric:NORMal:<Function>
Function Sets or queries the on/off status of the specified function's output when numeric data is saved to a file.
Syntax :FILE:SAVE:NUMeric:NORMal:<Function> {<Boolean>}
:FILE:SAVE:NUMeric:NORMal:<Function>?
<Function> = {URMS|IRMS|P|S|Q|...}
Example :FILE:SAVE:NUMERIC:NORMAL:URMS ON
:FILE:SAVE:NUMERIC:NORMAL:URMS? ->
:FILE:SAVE:NUMERIC:NORMAL:URMS 1
Description For information about the options available for <Function>, see Function Option List (1), in the DISPlay Group section on page 5-37.

:FILE:SAVE:NUMeric:NORMal:PRESet<x>

Function Presets the output on/off pattern of the element functions to be used when numeric data is saved to a file.

Syntax
```
:FILE:SAVE:NUMeric:NORMal:PRESet<x>
<x> = 1 or 2 (preset number)
```

Example
```
:FILE:SAVE:NUMERIC:NORMAL:PRESET1
```

Description For details on the output setting patterns that result when the pattern is reset, see the features guide, IM WT1801-01EN.

:FILE:SAVE:SETup[:EXECute]

Function Saves setup parameters to a file.

Syntax
```
:FILE:SAVE:SETup[:EXECute]
{<String>}
<String> = File name
```

Example
```
:FILE:SAVE:SETUP:EXECUTE "SETUP1"
```

Description
- Specify the file name without an extension.
- This command is an overlap command.

:FILE:SAVE:WAVE[:EXECute]

Function Saves waveform display data to a file.

Syntax
```
:FILE:SAVE:WAVE[:EXECute] {<String>}
<String> = File name
```

Example
```
:FILE:SAVE:WAVE:EXECUTE "WAVE1"
```

Description
- Specify the file name without an extension.
- This command is an overlap command.

5.8 HARMonics Group

The commands in this group deal with harmonic measurement.
You can make the same settings and queries that you can make by pressing HRM SET on the front panel.
The commands in this group are only valid on models with the simultaneous dual harmonic measurement (/G6) option or the harmonic measurement (/G5) option.

:HARMonics<x>?

Function Queries all harmonic measurement settings.

Syntax
```
:HARMonics<x>?
<x> = 1 or 2 (harmonic measurement group)
```

Description "HARMonics2" is only valid on models with the simultaneous dual harmonic measurement (/G6) option.

:HARMonics<x>:CONFigure?

Function Queries the harmonic measurement groups of all elements.

Syntax
```
:HARMonics<x>:CONFigure?
```

Description
- This command is only valid on models with the simultaneous dual harmonic measurement (/G6) option.
- The <x> value in HARMonics<x> has no meaning in the query.

:HARMonics<x>:CONFigure[:ALL]

Function Collectively sets the harmonic measurement group of all elements.

Syntax
```
:HARMonics<x>:CONFigure[:ALL] {<NRf>}
<NRf> = 1 (Hrm1), 2 (Hrm2)
```

Example
```
:HARMONICS:CONFIGURE:ALL 1
```

Description
- This command is only valid on models with the simultaneous dual harmonic measurement (/G6) option.
- The <x> value in HARMonics<x> has no meaning in the setting.

:HARMonics<x>:CONFigure:ELEMent<x>

Function Sets or queries the harmonic measurement group of the specified element.

Syntax
```
:HARMonics<x>:CONFigure:ELEMent<x> {<NRf>}
:HARMonics<x>:CONFigure:ELEMent<x>?
ELEMent<x>'s <x> = 1 to 6 (element)
<NRf> = 1 (Hrm1), 2 (Hrm2)
```

Example
```
:HARMONICS:CONFIGURE:ELEMENT1 1
:HARMONICS:CONFIGURE:ELEMENT1? ->
:HARMONICS1:CONFIGURE:ELEMENT1 1
```

Description
- This command is only valid on models with the simultaneous dual harmonic measurement (/G6) option.
- The <x> value in HARMonics<x> has no meaning in the setting or query.

:HARMonics<x>:CONFigure:{SIGMA|SIGMB|SIGMC}

Function Collectively sets the harmonic measurement group of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).

Syntax
```
:HARMonics<x>:CONFigure:{SIGMA|SIGMB|SIGMC} {<NRf>}
<NRf> = 1 (Hrm1), 2 (Hrm2)
```

Example
```
:HARMONICS:CONFIGURE:SIGMA 1
```

Description
- This command is only valid on models with the simultaneous dual harmonic measurement (/G6) option.
- The <x> value in HARMonics<x> has no meaning in the setting.

:HARMonics<x>:ORDer

Function Sets or queries the maximum and minimum harmonic orders that are analyzed.

Syntax
```
:HARMonics<x>:ORDer {<NRf>,<NRf>}
:HARMonics<x>:ORDer?
<x> = 1 or 2 (harmonic measurement group)
First <NRf> = 0 or 1 (minimum harmonic order that is analyzed)
Second <NRf> = 1 to 500 (maximum harmonic order that is analyzed)
```

Example
```
:HARMONICS:ORDER 1,100
:HARMONICS:ORDER? ->
:HARMONICS1:ORDER 1,100
```

:HARMonics<x>:PLLSource

Function Sets or queries the PLL source.

Syntax
```
:HARMonics<x>:PLLSource {U<x>|I<x>|EXTernal}
:HARMonics<x>:PLLSource?
HARMonics<x>'s <x> = 1 or 2 (harmonic measurement group)
U<x> and I<x>'s <x> = 1 to 6 (element)
EXTernal = External clock input (Ext Clk)
```

Example
```
:HARMONICS:PLLSOURCE U1
:HARMONICS:PLLSOURCE? ->
:HARMONICS1:PLLSOURCE U1
```

:HARMonics<x>:THD

Function Sets or queries the equation used to compute the THD (total harmonic distortion).

Syntax
```
:HARMonics<x>:THD {TOTal|FUNDamental}
:HARMonics<x>:THD?
<x> = 1 or 2 (harmonic measurement group)
```

Example
```
:HARMONICS:THD TOTAL
:HARMONICS:THD? -> :HARMONICS1:THD TOTAL
```

5.9 HCOPy Group

The commands in this group deal with printing on the built-in printer.
You can make the same settings and queries that you can make by pressing PRINT and MENU (SHIFT+PRINT) on the front panel.
The commands in this group are only valid on models with the built-in printer (/B5) option.

:HCOPy?
Function Queries all print settings.
Syntax :HCOPy?

:HCOPy:ABORt
Function Aborts a print operation.
Syntax :HCOPy:ABORt
Example :HCOPY:ABORT

:HCOPy:AUTO?
Function Queries all auto print settings.
Syntax :HCOPy:AUTO?

:HCOPy:AUTO:COUNt
Function Sets or queries the auto print count.
Syntax :HCOPy:AUTO:COUNt {<NRf>|INFinite}
:HCOPy:AUTO:COUNt?
<NRf> = 1 to 9999
INFinite = No limit
Example :HCOPY:AUTO:COUNT INFINITE
:HCOPY:AUTO:COUNT? ->
:HCOPY:AUTO:COUNT INFINITE
Description This command is valid when the auto print operation mode (:HCOPy:AUTO:MODE) is set to INTerval, RTIMe, or EVENt.

:HCOPy:AUTO:INTerval
Function Sets or queries the auto print interval.
Syntax :HCOPy:AUTO:INTerval {<NRf>,<NRf>,<NRf>}
:HCOPy:AUTO:INTerval?
{<NRf>,<NRf>,<NRf>} = 0, 0, 10 to 99, 59, 59
First <NRf> = 0 to 99 (hours)
Second <NRf> = 0 to 59 (minutes)
Third <NRf> = 0 to 59 (seconds)
Example :HCOPY:AUTO:INTERVAL 0,0,10
:HCOPY:AUTO:INTERVAL? ->
:HCOPY:AUTO:INTERVAL 0,0,10
Description This command is valid when the auto print operation mode (:HCOPy:AUTO:MODE) is set to INTerval, RTIMe, or INTEGrate.

:HCOPy:AUTO:MODE
Function Sets or queries the auto print operation mode.
Syntax :HCOPy:AUTO:MODE {INTerval|RTIMe|INTEGrate|EVENt}
:HCOPy:AUTO:MODE?
INTerval = Interval print mode
RTIMe = Real-time print mode
INTEGrate = Integration-synchronized print mode
EVENt = Event-synchronized print mode
Example :HCOPY:AUTO:MODE INTERVAL
:HCOPY:AUTO:MODE? ->
:HCOPY:AUTO:MODE INTERVAL

:HCOPy:AUTO:PASTart
Function Sets or queries whether printing starts when auto printing starts.
Syntax :HCOPy:AUTO:PASTart {<Boolean>}
:HCOPy:AUTO:PASTart?
Example :HCOPY:AUTO:PASTART OFF
:HCOPY:AUTO:PASTART? ->
:HCOPY:AUTO:PASTART 0
Description This command is valid when the auto print operation mode (:HCOPy:AUTO:MODE) is set to INTerval, RTIMe, or INTEGrate.

:HCOPy:AUTO:{STARt|END}
Function Sets or queries the printing start or end time for real-time printing mode.
Syntax :HCOPy:AUTO:{STARt|END} {<NRf>,<NRf>,<NRf>,<NRf>,<NRf>,<NRf>}
:HCOPy:AUTO:{STARt|END}?
{<NRf>,<NRf>,<NRf>,<NRf>,<NRf>,<NRf>} = 2001,1,1,0,0,0 to 2099,12,31,23,59,59
First <NRf> = 2001 to 2099 (year)
Second <NRf> = 1 to 12 (month)
Third <NRf> = 1 to 31 (day)
Fourth <NRf> = 0 to 23 (hour)
Fifth <NRf> = 0 to 59 (minute)
Sixth <NRf> = 0 to 59 (second)
Example :HCOPY:AUTO:START 2011,1,1,0,0,0
:HCOPY:AUTO:START? ->
:HCOPY:AUTO:START 2011,1,1,0,0,0
Description This command is valid when the auto print operation mode (:HCOPy:AUTO:MODE) is set to RTIMe.

:HCOPy:AUTO[:STATe]

Function Sets or queries the auto print feature's on/off status.

Syntax
```
:HCOPy:AUTO[:STATe] {<Boolean>}
:HCOPy:AUTO:STATe?
```

Example
```
:HCOPy:AUTO:STATE OFF
:HCOPy:AUTO:STATE? ->
:HCOPy:AUTO:STATE 0
```

:HCOPy:AUTO:TEVent

Function Sets or queries the event that the event-synchronized print mode will trigger on.

Syntax
```
:HCOPy:AUTO:TEVent {<NRf>}
:HCOPy:AUTO:TEVent?
<NRf> = 1 to 8 (event number)
```

Example
```
:HCOPY:AUTO:TEVENT 1
:HCOPY:AUTO:TEVENT? ->
:HCOPY:AUTO:TEVENT 1
```

Description This command is valid when the auto print operation mode (:HCOPy:AUTO:MODE) is set to EVENt.

:HCOPy:COMMent

Function Sets or queries the comment displayed at the bottom of the screen.

Syntax
```
:HCOPy:COMMent {<String>}
:HCOPy:COMMent?
<String> = Up to 30 characters
```

Example
```
:HCOPY:COMMENT "THIS IS TEST."
:HCOPY:COMMENT? ->
:HCOPY:COMMENT "THIS IS TEST."
```

:HCOPy:EXECute

Function Executes a print operation.

Syntax
```
:HCOPy:EXECute
```

Example
```
:HCOPY:EXECUTE
```

Description This is an overlap command.

:HCOPy:PRINter?

Function Queries all print settings for the built-in printer.

Syntax
```
:HCOPy:PRINter?
```

:HCOPy:PRINter:FEED

Function Executes a paper feed on the built-in printer.

Syntax
```
:HCOPy:PRINter:FEED
```

Example
```
:HCOPY:PRINTER:FEED
```

Description This is an overlap command.

:HCOPy:PRINter:FORMat

Function Sets or queries the contents that will be printed from the built-in printer.

Syntax
```
:HCOPy:PRINter:FORMat {SCReen|LIST}
:HCOPy:PRINter:FORMat?
SCReen = Screen image data
LIST = Numeric list data
```

Example
```
:HCOPY:PRINTER:FORMAT SCREEN
:HCOPY:PRINTER:FORMAT? ->
:HCOPY:PRINTER SCREEN
```

5.10 HOLD Group

The command in this group deals with the output data hold feature.
You can make the same settings and queries that you can make by pressing HOLD on the front panel.

:HOLD

Function Sets or queries the on/off status of the output hold feature for display, communication, and other types of data.

Syntax
```
:HOLD {<Boolean>}
:HOLD?
```

Example
```
:HOLD OFF
:HOLD? -> :HOLD 0
```

5.11 IMAGe Group

The commands in this group deal with saving screen image data. You can perform the same operations and make the same settings and queries that you can by pressing IMAGE SAVE and MENU (SHIFT+IMAGE SAVE) on the front panel.

:IMAGe?
Function Queries all screen image data output settings.
Syntax :IMAGe?

:IMAGe:ABORt
Function Aborts a screen image data output operation.
Syntax :IMAGe:ABORt
Example :IMAGE:ABORT

:IMAGe:COLor
Function Sets or queries the color tone of the screen image data that will be saved.
Syntax :IMAGe:COLor {OFF|COLor|REVerse|GRAY}
:IMAGe:COLor?
Example :IMAGE:COLOR OFF
:IMAGE:COLOR? ->
:IMAGE:COLOR OFF

:IMAGe:COMMent
Function Sets or queries the comment displayed at the bottom of the screen.
Syntax :IMAGe:COMMent {<String>}
:IMAGe:COMMent?
<String> = Up to 30 characters
Example :IMAGE:COMMENT "THIS IS TEST."
:IMAGE:COMMENT? ->
:IMAGE:COMMENT "THIS IS TEST."

:IMAGe:EXECute
Function Executes a screen image data output operation.
Syntax :IMAGe:EXECute
Example :IMAGE:EXECUTE

:IMAGe:FORMat
Function Sets or queries the format of the screen image data that will be saved.
Syntax :IMAGe:FORMat {BMP|PNG|JPEG}
:IMAGe:FORMat?
Example :IMAGE:FORMAT BMP
:IMAGE:FORMAT? ->
:IMAGE:FORMAT BMP

:IMAGe:SAVE?
Function Queries all screen image data save settings.
Syntax :IMAGe:SAVE?

:IMAGe:SAVE:ANAMing
Function Sets or queries the auto naming feature for saving files.
Syntax :IMAGe:SAVE:ANAMing {OFF|NUMBering|DATE}
:IMAGe:SAVE:ANAMing?
Example :IMAGE:SAVE:ANAMING NUMBERING
:IMAGE:SAVE:ANAMING? ->
:IMAGE:SAVE:ANAMING NUMBERING

:IMAGe:SAVE:CDIRectory
Function Changes the directory that screen image data is saved to.
Syntax :IMAGe:SAVE:CDIRectory {<String>}
<String> = Directory name
Example :IMAGE:SAVE:CDIRECTORY "IMAGE"
Description Specify ".." to move up to the parent directory.

:IMAGe:SAVE:DRIVe
Function Sets the drive that screen image data is saved to.
Syntax :IMAGe:SAVE:DRIVe {RAM|USB[,<NRf>]|NETWork}
RAM = Built-in RAM drive
USB = USB memory device drive,
<NRf> = 0 or 1 (drive number)
NETWork = Network drive
Example :IMAGE:SAVE:DRIVE RAM

:IMAGe:SAVE:FREE?
Function Queries the free space (in bytes) on the drive that the screen image data is saved to.
Syntax :IMAGe:SAVE:FREE?
Example :IMAGE:SAVE:FREE? -> 20912128

:IMAGe:SAVE:NAME

Function Sets or queries the name of the file that will be saved.

Syntax
```
:IMAGe:SAVE:NAME {<String>}
:IMAGe:SAVE:NAME?
<String> = File name
```

Example
```
:IMAGE:SAVE:NAME "IMAGE1"
:IMAGE:SAVE:NAME? ->
:IMAGE:SAVE:NAME "IMAGE1"
```

Description
- Use the :IMAGe:SAVE:DRIVe command to set the save destination drive and the :IMAGe:SAVE:CDIRectory command to set the directory.
- You can query the path that screen image data is saved to by using the :IMAGe:SAVE:PATH? command.
- Specify the file name without an extension.

:IMAGe:SAVE:PATH?

Function Queries the absolute path of the directory that the screen image data is saved to.

Syntax
```
:IMAGe:SAVE:PATH?
```

Example
```
:IMAGE:SAVE:PATH? -> "USB-0/IMAGE"
```

:IMAGe:SEND?

Function Queries the screen image data.

Syntax
```
:IMAGe:SEND?
```

Example
```
:IMAGE:SEND? -> #N (N-digit byte number)(data byte sequence)
```

Description N, the number of digits in the data byte number, varies depending on the output data size.

5.12 INPut Group

The commands in this group deal with the measurement conditions of the input elements.
You can make the same settings and queries that you can make by pressing the keys in the measurement condition setup area (the area outlined in blue), SCALING, LINE FILTER, FREQ FILTER (SHIFT+LINE FILTER), SYNC SOURCE, NULL, and NULL SET (SHIFT+NULL) on the front panel.

:INPut?

Function Queries all input element settings.
Syntax `:INPut?`

[:INPut]:CFACtor

Function Sets or queries the crest factor.
Syntax `[:INPut]:CFACtor {<NRf>}`
`[:INPut]:CFACtor?`
`<NRf> = 3, 6`
Example `:INPUT:CFACTOR 3`
`:INPUT:CFACTOR? ->`
`:INPUT:CFACTOR 3`

[:INPut]:CURRent?

Function Queries all electric current measurement settings.
Syntax `[:INPut]:CURRent?`

[:INPut]:CURRent:AUTO?

Function Queries the electric current auto range on/off statuses of all elements.
Syntax `[:INPut]:CURRent:AUTO?`

[:INPut]:CURRent:AUTO[:ALL]

Function Collectively sets the electric current auto range on/off status of all elements.
Syntax `[:INPut]:CURRent:AUTO[:ALL]`
`{<Boolean>}`
Example `:INPUT:CURRENT:AUTO:ALL ON`

[:INPut]:CURRent:AUTO:ELEMent<x>

Function Sets or queries the electric current auto range on/off status of the specified element.
Syntax `[:INPut]:CURRent:AUTO:`
`ELEMent<x> {<Boolean>}`
`[:INPut]:CURRent:AUTO:ELEMent<x>?`
`<x> = 1 to 6 (element)`
Example `:INPUT:CURRENT:AUTO:ELEMENT1 ON`
`:INPUT:CURRENT:AUTO:ELEMENT1? ->`
`:INPUT:CURRENT:AUTO:ELEMENT1 1`

[:INPut]:CURRent:AUTO:{SIGMA|SIGMB|SIGMC}

Function Collectively sets the electric current auto range on/off status of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).
Syntax `[:INPut]:CURRent:`
`AUTO:{SIGMA|SIGMB|SIGMC} {<Boolean>}`
Example `:INPUT:CURRENT:AUTO:SIGMA ON`
Description SIGMA, SIGMB, or SIGMC is invalid if the wiring system setting ([:INPut]:WIRing) is made in such a way that the corresponding wiring unit (ΣA, ΣB, or ΣC) does not exist.

[:INPut]:CURRent:CONFig?

Function Queries the valid electric current ranges of all elements.
Syntax `[:INPut]:CURRent:CONFig?`

[:INPut]:CURRent:CONFig[:ALL]

Function Collectively sets the valid electric current range of all elements.
Syntax `[:INPut]:CURRent:CONFig[:ALL] {ALL|`
`<Current>[,<Current>][,`
`<Current>]...}`
`ALL = All ranges are valid.`
- 50 A input elements
- When the crest factor is set to 3:
  <Current> = 1 A, 2 A, 5 A, 10 A, 20 A, 50 A
- When the crest factor is set to 6:
  <Current> = 500 mA, 1 A, 2.5 A, 5 A, 10 A, 25 A
- 5 A input elements
- When the crest factor is set to 3:
  <Current> = 10 mA, 20 mA, 50 mA, 100 mA, 200 mA, 500 mA, 1 A, 2 A, 5 A
- When the crest factor is set to 6:
  <Current> = 5 mA, 10 mA, 25 mA, 50 mA, 100 mA, 250 mA, 500 mA, 1 A, 2.5 A

Example `:INPUT:CURRENT:CONFIG:ALL ALL`
`:INPUT:CURRENT:CONFIG:ALL 50,10,5,1`
Description In the parameters, list all the electric current ranges that you want to enable. To enable all the ranges, specify the parameter “ALL.”

[:INPut]:CURRent:CONFig:ELEMent<x>

Function Sets or queries the valid electric current range of the specified element.

Syntax
```
[:INPut]:CURRent:CONFig:ELEMent<x>
{ALL|<Current>[,<Current>][,<Current
>]...}
[:INPut]:CURRent:CONFig:ELEMent<x>?
<x> = 1 to 6 (element)
ALL = All ranges are valid.
<Current> = See [:INPut]:CURRent:
CONFig[:ALL]
```

Example
```
:INPUT:CURRENT:CONFIG:ELEMENT1 ALL
:INPUT:CURRENT:CONFIG:ELEMENT1? ->
:INPUT:CURRENT:CONFIG:ELEMENT1 ALL
:INPUT:CURRENT:CONFIG:
ELEMENT1 50,10,5,1
:INPUT:CURRENT:CONFIG:ELEMENT1? ->
:INPUT:CURRENT:CONFIG:ELEMENT1 50.0E
+00,10.0E+00,5.0E+00,1.0E+00
```

Description In the parameters, list all the electric current ranges that you want to enable. To enable all the ranges, specify the parameter “ALL.”

[:INPut]:CURRent:EXTSensor?

Function Queries all external current sensor range settings.

Syntax
```
[:INPut]:CURRent:EXTSensor?
```

Description This command is only valid on models with the external current sensor input (/EX) option.

[:INPut]:CURRent:EXTSensor:CONFig?

Function Queries the valid external current sensor ranges of all elements.

Syntax
```
[:INPut]:CURRent:EXTSensor:CONFig?
```

[:INPut]:CURRent:EXTSensor:CONFig[:ALL]

Function Collectively sets the valid external current sensor range of all elements.

Syntax
```
[:INPut]:CURRent:EXTSensor:
CONFig[:ALL] {ALL|<Voltage>[,
<Voltage>][,<Voltage>]...}
ALL = All ranges are valid.
```
- When the crest factor is set to 3: <Voltage> = 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V, 5 V, 10 V
- When the crest factor is set to 6: <Voltage> = 25 mV, 50 mV, 100 mV, 250 mV, 500 mV, 1 V, 2.5 V, 5 V

Example
```
:INPUT:CURRENT:EXTSENSOR:CONFIG:
ALL ALL
:INPUT:CURRENT:EXTSENSOR:CONFIG:
ALL 10,5,2,1
```

Description In the parameters, list all the external current sensor ranges that you want to enable. To enable all the ranges, specify the parameter “ALL.”

[:INPut]:CURRent:EXTSensor:CONFig:ELEMent<x>

Function Sets or queries the valid external current sensor ranges of the specified element.

Syntax
```
[:INPut]:CURRent:EXTSensor:CONFig:
ELEMent<x> {ALL|<Voltage>[,
<Voltage>][,<Voltage>]...}
[:INPut]:CURRent:EXTSensor:CONFig:
ELEMent<x>?
<x> = 1 to 6 (element)
ALL = All ranges are valid.
<Voltage> = See [:INPut]:CURRent:
EXTSensor:CONFig[:ALL]
```

Example
```
:INPUT:CURRENT:EXTSENSOR:CONFIG:
ELEMENT1 ALL
:INPUT:CURRENT:EXTSENSOR:CONFIG:
ELEMENT1? ->
:INPUT:CURRENT:EXTSENSOR:CONFIG:
ELEMENT1 ALL
:INPUT:CURRENT:EXTSENSOR:CONFIG:
ELEMENT1 10,5,2,1
:INPUT:CURRENT:EXTSENSOR:CONFIG:
ELEMENT1? ->
:INPUT:CURRENT:EXTSENSOR:CONFIG:
ELEMENT1 10.00E+00,5.00E+00,
2.00E+00,1.00E+00
```

Description In the parameters, list all the external current sensor ranges that you want to enable. To enable all the ranges, specify the parameter “ALL.”

[:INPut]:CURRent:EXTSensor:DISPlay

Function Sets or queries the display mode of the external current sensor range.

Syntax
```
[:INPut]:CURRent:EXTSensor:DISPlay
{DIRect|MEASure}
[:INPut]:CURRent:EXTSensor:DISPlay?
```

Example
```
:INPUT:CURRENT:EXTSENSOR:
DISPLAY DIRECT
:INPUT:CURRENT:EXTSENSOR:DISPLAY? ->
:INPUT:CURRENT:EXTSENSOR:
DISPLAY DIRECT
```

[:INPut]:CURRent:EXTSensor:POJump?

Function Queries the jump destination ranges of all elements that are used when a current peak over-range occurs.

Syntax
```
[:INPut]:CURRent:EXTSensor:POJump?
```

[:INPut]:CURRent:EXTSensor:POJump[:ALL]

Function Collectively sets the jump destination range of all elements that is used when a current peak over-range occurs.

Syntax
```
[:INPut]:CURRent:EXTSensor:
POJump[:ALL] {OFF|<Voltage>}
OFF = No jump destination current
range
```
- When the crest factor is set to 3:
  <Voltage> = 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V, 5 V, 10 V
- When the crest factor is set to 6:
  <Voltage> = 25 mV, 50 mV, 100 mV, 250 mV, 500 mV, 1 V, 2.5 V, 5 V

Example
```
:INPUT:CURRENT:EXTSENSOR:POJUMP:
ALL OFF
```

[:INPut]:CURRent:EXTSensor:POJump:ELEMent<x>

Function Sets or queries the jump destination range of the specified element that is used when a current peak over-range occurs.

Syntax
```
[:INPut]:CURRent:EXTSensor:POJump:
ELEMent<x> {OFF|<Voltage>}
[:INPut]:CURRent:EXTSensor:POJump:
ELEMent<x>?
<x> = 1 to 6 (element)
OFF = No jump destination current
range
<Voltage> = See [:INPut]:CURRent:
EXTSensor:POJump[:ALL]
```

Example
```
:INPUT:CURRENT:EXTSENSOR:POJUMP:
ELEMENT1 10V
:INPUT:CURRENT:EXTSENSOR:POJUMP:
ELEMENT1? ->
:INPUT:CURRENT:EXTSENSOR:POJUMP:
ELEMENT1 10.00E+00
```

[:INPut]:CURRent:POJump?

Function Queries the jump destination ranges of all elements that are used when a current peak over-range occurs.

Syntax
```
[:INPut]:CURRent:POJump?
```

[:INPut]:CURRent:POJump[:ALL]

Function Collectively sets the jump destination range of all elements that is used when a current peak over-range occurs.

Syntax
```
[:INPut]:CURRent:
POJump[:ALL] {OFF|<Current>}
OFF = No jump destination current
range
```
- 50 A input elements
- When the crest factor is set to 3:
  <Current> = 1 A, 2 A, 5 A, 10 A, 20 A, 50 A
- When the crest factor is set to 6:
  <Current> = 500 mA, 1 A, 2.5 A, 5 A, 10 A, 25 A
- 5 A input elements
- When the crest factor is set to 3:
  <Current> = 10 mA, 20 mA, 50 mA, 100 mA, 200 mA, 500 mA, 1 A, 2 A, 5 A
- When the crest factor is set to 6:
  <Current> = 5 mA, 10 mA, 25 mA, 50 mA, 100 mA, 250 mA, 500 mA, 1 A, 2.5 A

Example
```
:INPUT:CURRENT:POJUMP:ALL OFF
```

[:INPut]:CURRent:POJump:ELEMent<x>

Function Sets or queries the jump destination range of the specified element that is used when a current peak over-range occurs.

Syntax
```
[:INPut]:CURRent:POJump:ELEMent<x>
{OFF|<Current>}
[:INPut]:CURRent:POJump:ELEMent<x>?
<x> = 1 to 6 (element)
OFF = No jump destination current
range
<Current> = See [:INPut]:CURRent:
POJump[:ALL]
```

Example
```
:INPUT:CURRENT:POJUMP:ELEMENT1 50A
:INPUT:CURRENT:POJUMP:ELEMENT1? ->
:INPUT:CURRENT:POJUMP:
ELEMENT1 50.0E+00
```

[:INPut]:CURRent:RANGe?

Function Queries the electric current ranges of all elements.

Syntax
```
[:INPut]:CURRent:RANGe?
```

[:INPut]:CURRent:RANGe[:ALL]

Function Collectively sets the electric current range of all elements.

Syntax
```
[:INPut]:CURRent:RANGe[:ALL] {<Current>|(EXTernal,<Voltage>)}
```
- 50 A input elements
- When the crest factor is set to 3:
  <Current> = 1 A, 2 A, 5 A, 10 A, 20 A, 50 A (for direct current input)
  <Voltage> = 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V, 5 V, 10 V (for external current sensor input)
- When the crest factor is set to 6:
  <Current> = 500 mA, 1 A, 2.5 A, 5 A, 10 A, 25 A (for direct current input)
  <Voltage> = 25 mV, 50 mV, 100 mV, 250 mV, 500 mV, 1 V, 2.5 V, 5 V (for external current sensor input)
- 5 A input elements
- When the crest factor is set to 3:
  <Current> = 10 mA, 20 mA, 50 mA, 100 mA, 200 mA, 500 mA, 1 A, 2 A, 5 A (for direct current input)
  <Voltage> = 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2 V, 5 V, 10 V (for external current sensor input)
- When the crest factor is set to 6:
  <Current> = 5 mA, 10 mA, 25 mA, 50 mA, 100 mA, 250 mA, 500 mA, 1 A, 2.5 A (for direct current input)
  <Voltage> = 25 mV, 50 mV, 100 mV, 250 mV, 500 mV, 1 V, 2.5 V, 5 V (for external current sensor input)

Example
```
:INPUT:CURRENT:RANGE:ALL 50A
:INPUT:CURRENT:RANGE:ALL
EXTERNAL,10V
```

Description EXTernal and <Voltage> can only be selected on models with the external current sensor input (/EX) option.

[:INPut]:CURRent:RANGe:ELEMent<x>

Function Sets or queries the electric current range of the specified element.

Syntax
```
[:INPut]:CURRent:RANGe:
ELEMent<x> {<Current>|(EXTernal,
<Voltage>)}
[:INPut]:CURRent:RANGe:ELEMent<x>?
<x> = 1 to 6 (element)
<Current>,<Voltage> = See [:INPut]:
CURRent:RANGe[:ALL]
```

Example
```
:INPUT:CURRENT:RANGE:ELEMENT1 50A
:INPUT:CURRENT:RANGE:ELEMENT1? ->
:INPUT:CURRENT:RANGE:
ELEMENT1 50.0E+00
:INPUT:CURRENT:RANGE:
ELEMENT1 EXTERNAL,10V
:INPUT:CURRENT:RANGE:ELEMENT1? ->
:INPUT:CURRENT:RANGE:
ELEMENT1 EXTERNAL,10.00E+00
```

[:INPut]:CURRent:RANGe:{SIGMA|SIGMB|SIGMC}

Function Collectively sets the electric current range of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).

Syntax
```
[:INPut]:CURRent:RANGe:{SIGMA|SIGMB|
SIGMC} {<Current>|(EXTernal,
<Voltage>)}
<Current>,<Voltage> = See [:INPut]:
CURRent:RANGe[:ALL]
```

Example
```
:INPUT:CURRENT:RANGE:SIGMA 50A
:INPUT:CURRENT:RANGE:
SIGMA EXTERNAL,10V
```

Description SIGMA, SIGMB, or SIGMC is invalid if the wiring system setting ([:INPut]:WIRing) is made in such a way that the corresponding wiring unit (ΣA, ΣB, or ΣC) does not exist.

[:INPut]:CURRent:SRATio?

Function Queries the external current sensor conversion ratios of all elements.

Syntax
```
[:INPut]:CURRent:SRATio?
```

Description This command is only valid on models with the external current sensor input (/EX) option.

[:INPut]:CURRent:SRATio[:ALL]

Function Collectively sets the external current sensor conversion ratios of all elements.

Syntax
```
[:INPut]:CURRent:SRATio[:ALL]
{<NRf>}
<NRf> = 0.0001 to 99999.9999
```

Example
```
:INPUT:CURRENT:SRATIO:ALL 10
```

[:INPut]:CURRent:SRATio:ELEMent<x>

Function Sets or queries the external current sensor conversion ratio of the specified element.

Syntax
```
[:INPut]:CURRent:SRATio:
ELEMent<x> {<NRf>}
[:INPut]:CURRent:SRATio:
ELEMent<x>?
<x> = 1 to 6 (element)
<NRf> = 0.0001 to 99999.9999
```

Example
```
:INPUT:CURRENT:SRATIO:ELEMENT1 10
:INPUT:CURRENT:SRATIO:ELEMENT1? ->
:INPUT:CURRENT:SRATIO:
ELEMENT1 10.0000
```

[:INPut]:CURRent:SRATio:{SIGMA|SIGMB|SIGMC}

Function Collectively sets the external current sensor conversion ratios of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).

Syntax
```
[:INPut]:CURRent:SRATio:
{SIGMA|SIGMB|SIGMC} {<NRf>}
<NRf> = 0.0001 to 99999.9999
```

Example
```
:INPUT:CURRENT:SRATIO:SIGMA 10
```

Description SIGMA, SIGMB, or SIGMC is invalid if the wiring system setting ([:INPut]:WIRing) is made in such a way that the corresponding wiring unit (ΣA, ΣB, or ΣC) does not exist.

[:INPut]:ESELect

Function Sets or queries the element whose measurement range will be set.

Syntax
```
[:INPut]:ESELect {<NRf>|ALL}
[:INPut]:ESELect?
<NRf> = 1 to 6 (element)
```

Example
```
:INPUT:ESELECT 1
:INPUT:ESELECT? -> :INPUT:ESELECT 1
```

[:INPut]:FILTer?

Function Queries all input filter settings.

Syntax
```
[:INPut]:FILTer?
```

[:INPut]:FILTer:FREQuency?

Function Queries the frequency filters of all elements.

Syntax
```
[:INPut]:FILTer:FREQuency?
```

[:INPut]:FILTer:FREQuency[:ALL]

Function Collectively sets the frequency filter of all elements.

Syntax
```
[:INPut]:FILTer:FREQuency[:ALL]
{OFF|<Frequency>}
OFF = Frequency filter off
<Frequency> = 100 Hz, 1 kHz (when the
line filter is on; cutoff frequency)
```

Example
```
:INPUT:FILTER:FREQUENCY:ALL OFF
```

[:INPut]:FILTer:FREQuency:ELEMent<x>

Function Sets or queries the frequency filter of the specified element.

Syntax
```
[:INPut]:FILTer:FREQuency:
ELEMent<x> {OFF|<Frequency>}
[:INPut]:FILTer:FREQuency:
ELEMent<x>?
<x> = 1 to 6 (element)
OFF = Frequency filter off
<Frequency> = 100 Hz, 1 kHz (when the
line filter is on; cutoff frequency)
```

Example
```
:INPUT:FILTER:FREQUENCY:
ELEMENT1 100HZ
:INPUT:FILTER:FREQUENCY:ELEMENT1? ->
:INPUT:FILTER:FREQUENCY:
ELEMENT1 100.0E+00
```

[:INPut]:FILTer:LINE?

Function Queries the line filters of all elements.

Syntax
```
[:INPut]:FILTer:LINE?
```

[:INPut]:FILTer[:LINE][:ALL]

Function Collectively sets the line filter of all elements.

Syntax
```
[:INPut]:FILTer[:LINE][:ALL]
{OFF|<Frequency>}
OFF = Line filter off
<Frequency> = 0.1 kHz to 100.0 kHz,
300 kHz, 1 MHz (when the line filter
is on; cutoff frequency)
```

Example
```
:INPUT:FILTER:LINE:ALL OFF
```

Description You can set the frequency between 0.1 kHz and 100.0 kHz with a resolution of 0.1 kHz.

[:INPut]:FILTer[:LINE]:ELEMent<x>

Function Sets or queries the line filter of the specified element.

Syntax
```
[:INPut]:FILTer[:LINE]:
ELEMent<x> {OFF|<Frequency>}
[:INPut]:FILTer[:LINE]:
ELEMent<x>?
<x> = 1 to 6 (element)
OFF = Line filter off
<Frequency> = 0.1 kHz to 100.0 kHz,
300 kHz, 1 MHz (when the line filter
is on; cutoff frequency)
```

Example
```
:INPUT:FILTER:LINE:ELEMENT1 0.5KHZ
:INPUT:FILTER:LINE:ELEMENT1? ->
:INPUT:FILTER:LINE:
ELEMENT1 500.0E+00
```

Description You can set the frequency between 0.1 kHz and 100.0 kHz with a resolution of 0.1 kHz.

[:INPut]:FILTer[:LINE]:{SIGMA|SIGMB|SIGMC}

Function Collectively sets the line filter of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).

Syntax
```
[:INPut]:FILTer[:LINE]:{SIGMA|SIGMB|
SIGMC} {OFF|<Frequency>}
OFF = Line filter off
<Frequency> = 0.1 kHz to 100.0 kHz,
300 kHz, 1 MHz (when the line filter
is on; cutoff frequency)
```

Example
```
:INPUT:FILTER:LINE:SIGMA 300KHZ
```

Description You can set the frequency between 0.1 kHz and 100.0 kHz with a resolution of 0.1 kHz.

[:INPut]:INDependent

Function Sets or queries the on/off status of independent input element configuration.

Syntax
```
[:INPut]:INDependent {<Boolean>}
[:INPut]:INDependent?
```

Example
```
:INPUT:INDEPENDENT OFF
:INPUT:INDEPENDENT? ->
:INPUT:INDEPENDENT 0
```

Description This command is only valid on models with 2 to 6 elements.

[:INPut]:MODUle?

Function Queries the input element type.

Syntax
```
[:INPut]:MODUle? {<NRf>}
[:INPut]:MODUle?
<NRf> = 1 to 6 (element)
```

Example
```
:INPUT:MODULE? 1 -> 50
:INPUT:MODULE? -> 50,50,50,50,50,50
```

Description
- The response is as follows:
  50 = 50 A input element (maximum current range = 50 A)
  5 = 5 A input element (maximum current range = 5 A)
  0 = No input element
- If the parameter is omitted, the input element types of all elements are output in order, starting with element 1.

[:INPut]:NULL:CONDition:{SPEed|TORQue|AUX<x>}

Function Queries the status of the NULL operation of rotating speed, torque, or AUX.

Syntax
```
[:INPut]:NULL:CONDition:
{SPEed|TORQue|AUX<x>}?
<x> = 1 or 2 (AUX input channel)
```

Example
```
:INPUT:NULL:CONDITION:SPEED? -> 1
```

Description
- The response is as follows:
  0 = NULL feature off
  1 = NULL feature in operation
- SPEed and TORQue are only valid on models with the motor evaluation function (/MTR) option.
- AUX<x> is only valid on models with the auxiliary input (/AUX) option.

[:INPut]:NULL:CONDition:{U<x>|I<x>}

Function Queries the status of the voltage or current NULL operation of the specified element.

Syntax
```
[:INPut]:NULL:CONDition:{U<x>|I<x>}?
<x> = 1 to 6 (element)
```

Example
```
:INPUT:NULL:CONDITION:U1? -> 1
```

Description The response is as follows:
```
0 = NULL feature off
1 = NULL feature in operation
```

[:INPut]:NULL[:STATe]

Function Sets or queries the on/off status of the NULL feature.

Syntax
```
[:INPut]:NULL[:STATe] {<Boolean>}
[:INPut]:NULL:STATe?
```

Example
```
:INPUT:NULL:STATE ON
:INPUT:NULL:STATE? ->
:INPUT:NULL:STATE 1
```

[:INPut]:NULL:TARGet?

Function Queries all settings for the target of the NULL feature.

Syntax
```
[:INPut]:NULL:TARGet?
```

[:INPut]:NULL:TARGet[:MODE]

Function Sets or queries the selection mode for the target of the NULL feature.

Syntax
```
[:INPut]:NULL:TARGet[:MODE]
{ALL|SELect}
[:INPut]:NULL:TARGet:MODE?
```

Example
```
:INPUT:NULL:TARGET:MODE ALL
:INPUT:NULL:TARGET:MODE? ->
:INPUT:NULL:TARGET:MODE ALL
```

[:INPut]:NULL:TARGet:{SPEed|TORQue|AUX<x>}

Function Sets or queries the target of the NULL operation (rotating speed, torque, or AUX).

Syntax
```
[:INPut]:NULL:TARGet:
{SPEed|TORQue|AUX<x>} {ON|HOLD|OFF}
[:INPut]:NULL:TARGet:
{SPEed|TORQue|AUX<x>}?
<x> = 1 or 2 (AUX input channel)
ON = NULL feature enabled (When NULL
is set to ON, a new NULL value is
acquired.)
HOLD = NULL feature enabled (When
NULL is set to ON, the previous NULL
value is maintained.)
OFF = NULL feature disabled (NULL
operation is not performed.)
```

Example
```
:INPUT:NULL:TARGET:SPEED ON
:INPUT:NULL:TARGET:SPEED? ->
:INPUT:NULL:TARGET:SPEED ON
```

Description
- SPEed and TORQue are only valid on models with the motor evaluation function (/MTR) option.
- AUX<x> is only valid on models with the auxiliary input (/AUX) option.

[:INPut]:NULL:TARGet:{U<x>|I<x>}

Function Sets or queries the target of the voltage or current NULL operation of the specified element.

Syntax
```
[:INPut]:NULL:TARGet:{U<x>|
I<x>} {ON|HOLD|OFF}
[:INPut]:NULL:TARGet:{U<x>|I<x>}?
<x> = 1 to 6 (element)
ON = NULL feature enabled (When NULL
is set to ON, a new NULL value is
acquired.)
HOLD = NULL feature enabled (When
NULL is set to ON, the previous NULL
value is maintained.)
OFF = NULL feature disabled (NULL
operation is not performed.)
```

Example
```
:INPUT:NULL:TARGET:U1 ON
:INPUT:NULL:TARGET:U1? ->
:INPUT:NULL:TARGET:U1 ON
```

[:INPut]:NULL:TARGet:{UALL|IALL}

Function Collectively sets the target of the voltage or current NULL operation of all elements.

Syntax
```
[:INPut]:NULL:TARGet:{UALL|
IALL} {ON|HOLD|OFF}
ON = NULL feature enabled (When NULL
is set to ON, a new NULL value is
acquired.)
HOLD = NULL feature enabled (When
NULL is set to ON, the previous NULL
value is maintained.)
OFF = NULL feature disabled (NULL
operation is not performed.)
```

Example
```
:INPUT:NULL:TARGET:UALL ON
```

[:INPut]:POVer?

Function Queries the peak over-range information.

Syntax
```
[:INPut]:POVer?
```

Example
```
:INPUT:POVER? -> 0
```

Description
- The peak over-range information of each element is mapped as shown below. For the response, the sum of the values of each bit is returned in decimal format.
- For example, a response of 16 indicates that a peak over-range is occurring at U3.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
A2	A1	Tq	Sp	I6	U6	I5	U5	I4	U4	I3	U3	I2	U2	I1	U1

Sp: Rotating speed
Tq: Torque
A1: AUX1
A2: AUX2

[:INPut]:SCALing?

Function Queries all scaling settings.

Syntax
```
[:INPut]:SCALing?
```

[:INPut]:SCALing:STATe?

Function Queries the on/off statuses of the scaling of all elements.

Syntax
```
[:INPut]:SCALing:STATe?
```

[:INPut]:SCALing[:STATe][:ALL]

Function Collectively sets the on/off status of the scaling of all elements.

Syntax
```
[:INPut]:SCALing[:STATe][:ALL]
{<Boolean>}
```

Example
```
:INPUT:SCALING:STATE:ALL OFF
```

[:INPut]:SCALing[:STATe]:ELEMent<x>

Function Sets or queries the on/off status of the scaling of the specified element.

Syntax
```
[:INPut]:SCALing[:STATe]:ELEMent<x>
{<Boolean>}
[:INPut]:SCALing[:STATe]:ELEMent<x>?
<x> = 1 to 6 (element)
```

Example
```
:INPUT:SCALING:STATE:ELEMENT1 OFF
:INPUT:SCALING:STATE:ELEMENT1? ->
:INPUT:SCALING:STATE:ELEMENT1 0
```

[:INPut]:SCALing:{VT|CT|SFACtor}?

Function Queries the VT ratios, CT ratios, or power coefficients of all elements.

Syntax
```
[:INPut]:SCALing:{VT|CT|SFACtor}?
```

[:INPut]:SCALing:{VT|CT|SFACtor}[:ALL]

Function Collectively sets the VT ratio, CT ratio, or power coefficient of all elements.

Syntax
```
[:INPut]:SCALing:{VT|CT|SFACtor}
[:ALL] {<NRf>}
<NRf> = 0.0001 to 99999.9999
```

Example
```
:INPUT:SCALING:VT:ALL 1
```

[:INPut]:SCALing:{VT|CT|SFACtor}:ELEMent<x>

Function Sets or queries the VT ratio, CT ratio, or power coefficient of the specified element.

Syntax
```
[:INPut]:SCALing:{VT|CT|SFACtor}:
ELEMent<x> {<NRf>}
[:INPut]:SCALing:{VT|CT|SFACtor}:
ELEMent<x>?
<x> = 1 to 6 (element)
<NRf> = 0.0001 to 99999.9999
```

Example
```
:INPUT:SCALING:VT:ELEMENT1 1
:INPUT:SCALING:VT:ELEMENT1? ->
:INPUT:SCALING:VT:ELEMENT1 1.0000
```

[:INPut]:SCALing:{VT|CT|SFACtor}:{SIGMA|SIGMB|SIGMC}

Function Collectively sets the VT ratio, CT ratio, or power coefficient of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).

Syntax
```
[:INPut]:SCALing:{VT|CT|SFACtor}:
{SIGMA|SIGMB|SIGMC} {<NRf>}
<NRf> = 0.0001 to 99999.9999
```

Example
```
:INPUT:SCALING:VT:SIGMA 1
```

Description SIGMA, SIGMB, or SIGMC is invalid if the wiring system setting ([:INPut]:WIRing) is made in such a way that the corresponding wiring unit (ΣA, ΣB, or ΣC) does not exist.

[:INPut]:SYNChronize?

Function Queries the synchronization sources of all elements.

Syntax
```
[:INPut]:SYNChronize?
```

[:INPut]:SYNChronize[:ALL]

Function Collectively sets the synchronization source of all elements.

Syntax
```
[:INPut]:SYNChronize[:ALL]
{U<x>|I<x>|EXTernal|NONE}
<x> = 1 to 6 (element)
EXTernal = External clock input (Ext Clk)
NONE = No synchronization source
```

Example
```
:INPUT:SYNCHRONIZE:ALL I1
```

[:INPut]:SYNChronize:ELEMent<x>

Function Sets or queries the synchronization source of the specified element.

Syntax
```
[:INPut]:SYNChronize:ELEMent<x>
{U<x>|I<x>|EXTernal|NONE}
[:INPut]:SYNChronize:ELEMent<x>?
<x> = 1 to 6 (element)
EXTernal = External clock input (Ext Clk)
NONE = No synchronization source
```

Example
```
:INPUT:SYNCHRONIZE:ELEMENT1 I1
:INPUT:SYNCHRONIZE:ELEMENT1? ->
:INPUT:SYNCHRONIZE:ELEMENT1 I1
```

[:INPut]:SYNChronize:{SIGMA|SIGMB|SIGMC}

Function Collectively sets the synchronization source of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).

Syntax
```
[:INPut]:SYNChronize:{SIGMA|SIGMB|
SIGMC} {U<x>|I<x>|EXTernal|NONE}
<x> = 1 to 6 (element)
EXTernal = External clock input (Ext Clk)
NONE = No synchronization source
```

Example
```
:INPUT:SYNCHRONIZE:SIGMA I1
```

Description SIGMA, SIGMB, or SIGMC is invalid if the wiring system setting ([:INPut]:WIRing) is made in such a way that the corresponding wiring unit (ΣA, ΣB, or ΣC) does not exist.

[:INPut]:VOLTage?

Function Queries all voltage measurement settings.

Syntax
```
[:INPut]:VOLTage?
```

[:INPut]:VOLTage:AUTO?

Function Queries the voltage auto range on/off statuses of all elements.

Syntax
```
[:INPut]:VOLTage:AUTO?
```

[:INPut]:VOLTage:AUTO[:ALL]

Function Collectively sets the voltage auto range on/off status of all elements.

Syntax
```
[:INPut]:VOLTage:AUTO[:ALL]
{<Boolean>}
```

Example
```
:INPUT:VOLTAGE:AUTO:ALL ON
```

[:INPut]:VOLTage:AUTO:ELEMent<x>

Function Sets or queries the voltage auto range on/off status of the specified element.

Syntax
```
[:INPut]:VOLTage:AUTO:ELEMent<x>
{<Boolean>}
[:INPut]:VOLTage:AUTO:ELEMent<x>?
<x> = 1 to 6 (element)
```

Example
```
:INPUT:VOLTAGE:AUTO:ELEMENT1 ON
:INPUT:VOLTAGE:AUTO:ELEMENT1? ->
:INPUT:VOLTAGE:AUTO:ELEMENT1 1
```

[:INPut]:VOLTage:AUTO:{SIGMA|SIGMB|SIGMC}

Function Collectively sets the voltage auto range on/off status of all elements.

Syntax
```
[:INPut]:VOLTage:
AUTO:{SIGMA|SIGMB|SIGMC} {<Boolean>}
```

Example
```
:INPUT:VOLTAGE:AUTO:SIGMA ON
```

Description SIGMA, SIGMB, or SIGMC is invalid if the wiring system setting ([:INPut]:WIRing) is made in such a way that the corresponding wiring unit (ΣA, ΣB, or ΣC) does not exist.

[:INPut]:VOLTage:CONFig?

Function Queries the valid voltage ranges of all elements.

Syntax
```
[:INPut]:VOLTage:CONFig?
```

[:INPut]:VOLTage:CONFig[:ALL]

Function Collectively sets the valid voltage range of all elements.

Syntax
```
[:INPut]:VOLTage:CONFig[:ALL]
{ALL|<Voltage>[,<Voltage>][,
<Voltage>]...}
ALL = All ranges are valid.
```
- When the crest factor is set to 3:
  <Voltage> = 1.5 V, 3 V, 6 V, 10 V, 15 V, 30 V, 60 V, 100 V, 150 V, 300 V, 600 V, 1000 V
- When the crest factor is set to 6:
  <Voltage> = 0.75 V, 1.5 V, 3 V, 5 V, 7.5 V, 15 V, 30 V, 50 V, 75 V, 150 V, 300 V, 500 V

Example
```
:INPUT:VOLTAGE:CONFIG:ALL ALL
:INPUT:VOLTAGE:CONFIG:ALL
1000,300,100,30,10
```

Description In the parameters, list all the voltage ranges that you want to enable. To enable all the ranges, specify the parameter “ALL.”

[:INPut]:VOLTage:CONFig:ELEMent<x>

Function Sets or queries the valid voltage ranges of the specified element.

Syntax
```
[:INPut]:VOLTage:CONFig:ELEMent<x>
{ALL|<Voltage>[,<Voltage>][,
<Voltage>]...}
[:INPut]:VOLTage:CONFig:ELEMent<x>?
<x> = 1 to 6 (element)
ALL = All ranges are valid.
<Voltage> = See [:INPut]:VOLTage:
CONFig
[:ALL]
```

Example
```
:INPUT:VOLTAGE:CONFIG:ELEMENT1 ALL
:INPUT:VOLTAGE:CONFIG:ELEMENT1? ->
:INPUT:VOLTAGE:CONFIG:ELEMENT1 ALL
:INPUT:VOLTAGE:CONFIG:ELEMENT1
1000,300,100,30,10
:INPUT:VOLTAGE:CONFIG:ELEMENT1? ->
:INPUT:VOLTAGE:CONFIG:ELEMENT1
1.0000E+03,300.0E+00,100.0E+00,30.0E
+00,10.0E+00
```

Description In the parameters, list all the voltage ranges that you want to enable. To enable all the ranges, specify the parameter “ALL.”

[:INPut]:VOLTage:POJump?

Function Queries the jump destination ranges of all elements that are used when a voltage peak over-range occurs.

Syntax
```
[:INPut]:VOLTage:POJump?
```

[:INPut]:VOLTage:POJump[:ALL]

Function Collectively sets the jump destination range of all elements that is used when a voltage peak over-range occurs.

Syntax
```
[:INPut]:VOLTage:POJump[:ALL]
{OFF|<Voltage>}
OFF = No jump destination voltage
range
```
- When the crest factor is set to 3:
  <Voltage> = 1.5 V, 3 V, 6 V, 10 V, 15 V, 30 V, 60 V, 100 V, 150 V, 300 V, 600 V, 1000 V
- When the crest factor is set to 6:
  <Voltage> = 0.75 V, 1.5 V, 3 V, 5 V, 7.5 V, 15 V, 30 V, 50 V, 75 V, 150 V, 300 V, 500 V

Example
```
:INPUT:VOLTAGE:POJUMP:ALL OFF
```

[:INPut]:VOLTage:POJump:ELEMent<x>

Function Sets or queries the jump destination range of the specified element that is used when a voltage peak over-range occurs.

Syntax
```
[:INPut]:VOLTage:POJump:ELEMent<x>
{OFF|<Voltage>}
[:INPut]:VOLTage:POJump:ELEMent<x>?
<x> = 1 to 6 (element)
OFF = No jump destination voltage
range
<Voltage> = See [:INPut]:VOLTage:
POJump[:ALL]
```

Example
```
:INPUT:VOLTAGE:POJUMP:ELEMENT1 1000V
:INPUT:VOLTAGE:POJUMP:ELEMENT1? ->
:INPUT:VOLTAGE:POJUMP:
ELEMENT1 1.0000E+03
```

[:INPut]:VOLTage:RANGe?

Function Queries the voltage ranges of all elements.

Syntax
```
[:INPut]:VOLTage:RANGe?
```

[:INPut]:VOLTage:RANGe[:ALL]

Function Collectively sets the voltage range of all elements.

Syntax
```
[:INPut]:VOLTage:RANGe[:ALL]
{<Voltage>}
```
- When the crest factor is set to 3:
  <Voltage> = 1.5 V, 3 V, 6 V, 10 V, 15 V, 30 V, 60 V, 100 V, 150 V, 300 V, 600 V, 1000 V
- When the crest factor is set to 6:
  <Voltage> = 0.75 V, 1.5 V, 3 V, 5 V, 7.5 V, 15 V, 30 V, 50 V, 75 V, 150 V, 300 V, 500 V

Example
```
:INPUT:VOLTAGE:RANGE:ALL 1000V
```

[:INPut]:VOLTage:RANGe:ELEMent<x>

Function Sets or queries the voltage range of the specified element.

Syntax
```
[:INPut]:VOLTage:RANGe:
ELEMent<x> {<Voltage>}
[:INPut]:VOLTage:RANGe:ELEMent<x>?
<x> = 1 to 6 (element)
<Voltage> = See [:INPut]:VOLTage:
RANGe[:ALL]
```

Example
```
:INPUT:VOLTAGE:RANGE:ELEMENT1 1000V
:INPUT:VOLTAGE:RANGE:ELEMENT1? ->
:INPUT:VOLTAGE:RANGE:
ELEMENT1 1.000E+03
```

[:INPut]:VOLTage:RANGe:{SIGMA|SIGMB|SIGMC}

Function Collectively sets the voltage range of all the elements that belong to the specified wiring unit (ΣA, ΣB, or ΣC).

Syntax
```
[:INPut]:VOLTage:RANGe:
{SIGMA|SIGMB|SIGMC} {<Voltage>}
<Voltage> = See [:INPut]:VOLTage:
RANGe[:ALL]
```

Example
```
:INPUT:VOLTAGE:RANGE:SIGMA 1000V
```

Description SIGMA, SIGMB, or SIGMC is invalid if the wiring system setting ([:INPut]:WIRing) is made in such a way that the corresponding wiring unit (ΣA, ΣB, or ΣC) does not exist.

[:INPut]:WIRing

Function Sets or queries the wiring system.

Syntax
```
[:INPut]:WIRing {(P1W2|P1W3|P3W3|
P3W4|V3A3)[,(P1W2|P1W3|P3W3|P3W4|
V3A3)][,(P1W2|P1W3|P3W3|P3W4|V3A3)]
[,(P1W2|P1W3|P3W3|P3W4|V3A3)]
[,(P1W2|P1W3|P3W3)][,P1W2]}
[:INPut]:WIRing?
P1W2 = Single-phase, two-wire system
[1P2W]
P1W3 = Single-phase, three-wire
system [1P3W]
P3W3 = Three-phase, three-wire
system [3P3W]
P3W4 = Three-phase, four-wire system
[3P3W]
V3A3 = Three-phase, three-wire
system with a three-voltage, three-
current method
[3P3W(3V3A)]
```

Example
- Example for a 6-element model

```
INPUT:WIRING P1W2,P1W2,P1W2,P1W2,
P1W2,P1W2
INPUT:WIRING? -> :INPUT:WIRING P1W2,
P1W2,P1W2,P1W2,P1W2,P1W2
INPUT:WIRING P1W3,P1W3,P1W3
INPUT:WIRING? ->
:INPUT:WIRING P1W3,P1W3,P1W3
INPUT:WIRING P3W4,V3A3
INPUT:WIRING? ->
:INPUT:WIRING P3W4,V3A3
```

- Example for a 3-element model

```
INPUT:WIRING P1W2,P3W3
INPUT:WIRING? ->
:INPUT:WIRING P1W2,P3W3
INPUT:WIRING P3W4
INPUT:WIRING? ->
:INPUT:WIRING P3W4
```

Description
- Set the wiring system pattern in order starting from the element with the smallest number.
- Some wiring system patterns cannot be selected on certain model types. For details on the available wiring system patterns, see the features guide, IM WT1801-01EN.
- The pattern is fixed to P1W2 on 1-element models. No other setting is allowed.

5.13 INTEGrate Group

The commands in this group deal with integration.
You can make the same settings and queries that you can make by pressing INTEG on the front panel.

:INTEGrate?

Function Queries all integration settings.
Syntax `:INTEGrate?`

:INTEGrate:ACAL

Function Sets or queries the on/off status of integration auto calibration.
Syntax `:INTEGrate:ACAL {<Boolean>}`
`:INTEGrate:ACAL?`
Example `:INTEGRATE:ACAL OFF`
`:INTEGRATE:ACAL? ->`
`:INTEGRATE:ACAL 0`

:INTEGrate:INDependent

Function Sets or queries the on/off status of independent element integration.
Syntax `:INTEGrate:INDependent {<Boolean>}`
`:INTEGrate:INDependent?`
Example `:INTEGRATE:INDEPENDENT OFF`
`:INTEGRATE:INDEPENDENT? ->`
`:INTEGRATE:INDEPENDENT 0`

:INTEGrate:MODE

Function Sets or queries the integration mode.
Syntax `:INTEGrate:MODE {NORMal|CONTinuous|RNORmal|RCONtinuous}`
`:INTEGrate:MODE?`
`NORMal = Normal integration mode`
`CONTinuous = Continuous integration mode`
`RNORmal = Real-time normal integration mode`
`RCONtinuous = Real-time continuous integration mode`
Example `:INTEGRATE:MODE NORMAL`
`:INTEGRATE:MODE? ->`
`:INTEGRATE:MODE NORMAL`

:INTEGrate:QMODe?

Function Queries the electric current modes for electric current integration of all elements.
Syntax `:INTEGrate:QMODe?`

:INTEGrate:QMODe[:ALL]

Function Collectively sets the electric current mode for electric current integration of all elements.
Syntax `:INTEGrate:QMODe[:ALL] {RMS|MEAN|DC|RMEAN|AC}`
Example `:INTEGRATE:QMODE:ALL DC`

:INTEGrate:QMODe:ELEMent<x>

Function Sets or queries the electric current mode for electric current integration of the specified element.
Syntax `:INTEGrate:QMODe:ELEMent<x> {RMS|MEAN|DC|RMEAN|AC}`
`:INTEGrate:QMODe:ELEMent<x>?`
`<x> = 1 to 6 (element)`
Example `:INTEGRATE:QMODE:ELEMENT1 DC`
`:INTEGRATE:QMODE:ELEMENT1? ->`
`:INTEGRATE:QMODE:ELEMENT1 DC`
Description Regardless of the independent element integration setting (:INTEGrate:INDependent), the WT1800 operates according to the electric current mode of the specified element.

:INTEGrate:RESet

Function Resets the integrated value.
Syntax `:INTEGrate:RESet {[<NRf>][,<NRf>][,<NRf>][,<NRf>][,<NRf>][,<NRf>]}`
`<NRf> = 1 to 6 (element)`
Example `:INTEGRATE:RESET (resets all elements)`
`:INTEGRATE:RESET 1,2,3 (resets the specified elements)`
Description
- When independent element integration (:INTEGrate:INDependent) is set to ON (1), you can use the parameters to specify which elements to perform the operation on. If you omit the parameters, the operation will be performed on all the elements.
- When independent element integration (:INTEGrate:INDependent) is set to OFF (0), you cannot use the parameters to specify elements.

:INTEGrate:RTALl:{STARt|END}

Function Collectively sets the integration start or end time of all elements for real-time integration mode.
Syntax `:INTEGrate:RTALl:{STARt|END} {<NRf>,<NRf>,<NRf>,<NRf>,<NRf>,<NRf>}`
`{<NRf>,<NRf>,<NRf>,<NRf>,<NRf>,<NRf>} = 2001,1,1,0,0,0 to 2099,12,31,23,59,59`
`First <NRf> = 2001 to 2099 (year)`
`Second <NRf> = 1 to 12 (month)`
`Third <NRf> = 1 to 31 (day)`
`Fourth <NRf> = 0 to 23 (hour)`
`Fifth <NRf> = 0 to 59 (minute)`
`Sixth <NRf> = 0 to 59 (second)`
Example `:INTEGRATE:RTALL:START 2010,1,1,0,0,0`

:INTEGrate:RTIMe<x>?

Function Queries the integration start and end times for real-time integration mode.

Syntax
```
:INTEGrate:RTIMe<x>?
<x> = 1 to 6 (element)
```

:INTEGrate:RTIMe<x>:{STARt|END}

Function Sets or queries the integration start or end time for real-time integration mode.

Syntax
```
:INTEGrate:RTIMe<x>:{STARt|
END} {<NRf>,<NRf>,<NRf>,<NRf>,<NRf>,
<NRf>}
:INTEGrate:RTIMe<x>:{STARt|END}?
<x> = 1 to 6 (element)
{<NRf>,<NRf>,<NRf>,<NRf>,
<NRf>,<NRf>} = 2001,1,1,0,0,0 to
2099,12,31,23,59,59
First <NRf> = 2001 to 2099 (year)
Second <NRf> = 1 to 12 (month)
Third <NRf> = 1 to 31 (day)
Fourth <NRf> = 0 to 23 (hour)
Fifth <NRf> = 0 to 59 (minute)
Sixth <NRf> = 0 to 59 (second)
```

Example
```
:INTEGRATE:RTIME1:START 2010,1,1,
0,0,0
:INTEGRATE:RTIME1:START? ->
:INTEGRATE:RTIME1:START 2010,1,1,
0,0,0
```

Description
- This command is valid when the integration mode (:INTEGrate:MODE) is set to real-time integration mode (RNORmal or RCONtinuous).
- When independent element integration (:INTEGrate:INDependent) is set to OFF (0), you can omit <x> (<x> = 1). The operation is performed on all elements using element 1's integration start or end time.

:INTEGrate:STARt

Function Starts integration.

Syntax
```
:INTEGrate:STARt {[<NRf>][,<NRf>]
[,<NRf>][,<NRf>][,<NRf>][,<NRf>]}
<NRf> = 1 to 6 (element)
```

Example
```
:INTEGRATE:START (starts integration
on all elements)
:INTEGRATE:START 1,2,3 (starts
integration on the specified
elements)
```

Description
- When independent element integration (:INTEGrate:INDependent) is set to ON (1), you can use the parameters to specify which elements to perform the operation on. If you omit the parameters, the operation will be performed on all the elements.
- When independent element integration (:INTEGrate:INDependent) is set to OFF (0), you cannot use the parameters to specify elements.

:INTEGrate:STATe?

Function Queries the integration status.

Syntax
```
:INTEGrate:STATe? {<NRf>}
:INTEGrate:STATe?
<NRf> = 1 to 6 (element)
```

Example
• When independent element integration (:INTEGrate:INDependent) is set to OFF (0):
```
:INTEGRATE:STATE? -> RESET
```
• When independent element integration (:INTEGrate:INDependent) is set to ON (1):
```
:INTEGRATE:STATE? 1 -> RESET
:INTEGRATE:STATE? ->
RESET,RESET,RESET,RESET,RESET,RESET
```

Description
- The response is as follows:
  RESet = Integration reset
  READy = Waiting (real-time integration mode)
  STARt = Integration in progress
  STOP = Integration stop
  ERRor = Abnormal integration termination (integration overflow, power failure)
  TIMeup = Integration stop due to integration timeout
- When independent element integration (:INTEGrate:INDependent) is set to OFF (0), you cannot use the parameter to specify the element that you want to query.
- When independent element integration (:INTEGrate:INDependent) is set to ON (1), you can use the parameter to specify the element. If the parameter is omitted, the integration statuses of all elements are output in order, starting with element 1.

:INTEGrate:STOP

Function Stops integration.

Syntax
```
:INTEGrate:STOP {[<NRf>][,<NRf>]
[,<NRf>][,<NRf>][,<NRf>][,<NRf>]}
<NRf> = 1 to 6 (element)
```

Example
```
:INTEGRATE:STOP (stops integration
on all elements)
:INTEGRATE:STOP 1,2,3 (stops
integration on the specified
elements)
```

Description
- When independent element integration (:INTEGrate:INDependent) is set to ON (1), you can use the parameters to specify which elements to perform the operation on. If you omit the parameters, the operation will be performed on all the elements.
- When independent element integration (:INTEGrate:INDependent) is set to OFF (0), you cannot use the parameters to specify elements.

:INTEGrate:TIMer<x>

Function Sets or queries the integration timer value.

Syntax
```
:INTEGrate:TIMer<x> {<NRf>,<NRf>,
<NRf>}
:INTEGrate:TIMer<x>?
<x> = 1 to 6 (element)
{<NRf>,<NRf>,<NRf>}=0,0,0 to 10000, 0,
0
First <NRf> = 0 to 10000 (hours)
Second <NRf> = 0 to 59 (minutes)
Third <NRf> = 0 to 59 (seconds)
```

Example
```
:INTEGRATE:TIMER1 1,0,0
:INTEGRATE:TIMER1? -> :INTEGRATE:
TIMER1 1,0,0
```

Description When independent element integration (:INTEGrate:INDependent) is set to OFF (0), you can omit <x> (<x> = 1). The operation is performed on all elements using element 1's integration timer.

:INTEGrate:TMALl

Function Collectively sets the integration timer of all elements.

Syntax
```
:INTEGrate:TMALl {<NRf>,<NRf>,<NRf>}
{<NRf>,<NRf>,<NRf>}=0,0,0 to 10000, 0,
0
First <NRf> = 0 to 10000 (hours)
Second <NRf> = 0 to 59 (minutes)
Third <NRf> = 0 to 59 (seconds)
```

Example
```
:INTEGRATE:TMALL 1,0,0
```

:INTEGrate:WPTYpe?

Function Queries the watt-hour integration methods for each polarity (WP+/WP–) of all elements.

Syntax
```
:INTEGrate:WPTYpe?
```

:INTEGrate:WPTYpe[:ALL]

Function Collectively sets the watt-hour integration method for each polarity (WP+/WP–) of all elements.

Syntax
```
:INTEGrate:WPTYpe[:ALL]
{CHARge|SOLD}
```

Example
```
:INTEGRATE:WPTYPE:ALL CHARGE
```

:INTEGrate:WPTYpe:ELEMent<x>

Function Sets or queries the watt-hour integration method for each polarity (WP+/WP–) of the specified element.

Syntax
```
:INTEGrate:WPTYpe:
ELEMent<x> {CHARge|SOLD}
:INTEGrate:WPTYpe:ELEMent<x>?
<x> = 1 to 6 (element)
CHARge = Charge-discharge
SOLD = Commercial power
```

Example
```
:INTEGRATE:WPTYPE:ELEMENT1 CHARGE
:INTEGRATE:WPTYPE:ELEMENT1? ->
:INTEGRATE:WPTYPE:ELEMENT1 CHARGE
```

Description Regardless of the independent element integration setting (:INTEGrate:INDependent), the WT1800 operates according to the integration method of the specified element.

5.14 MEASure Group

The commands in this group deal with computation.
You can make the same settings and queries that you can make by pressing MEASURE, FREQ MEASURE (SHIFT+MEASURE), and AVG on the front panel or by pressing WIRING on the front panel and then using the η Formula or Δ Measure (/DT option) menu.

:MEASure?
Function Queries all computation settings.
Syntax `:MEASure?`

:MEASure:AVERaging?
Function Queries all averaging settings.
Syntax `:MEASure:AVERaging?`

:MEASure:AVERaging:COUNt
Function Sets or queries the averaging coefficient.
Syntax
```
:MEASure:AVERaging:COUNt {<NRf>}
:MEASure:AVERaging:COUNt?
<NRf> = 2 to 64 (attenuation constant
when TYPE = EXPonent)
<NRf> = 8 to 64 (moving average
count when TYPE = LINear)
```
Example
```
:MEASURE:AVERAGING:COUNT 2
:MEASURE:AVERAGING:COUNT? ->
:MEASURE:AVERAGING:COUNT 2
```
Description The averaging of harmonic measurement functions (option) is only valid when TYPE is set to EXPonent (attenuation constant). For details, see the features guide, IM WT1801-01EN.

:MEASure:AVERaging[:STATe]
Function Sets or queries the on/off status of averaging.
Syntax
```
:MEASure:AVERaging[:
STATe] {<Boolean>}
:MEASure:AVERaging:STATe?
```
Example
```
:MEASURE:AVERAGING:STATE ON
:MEASURE:AVERAGING:STATE? ->
:MEASURE:AVERAGING:STATE 1
```

:MEASure:AVERaging:TYPE
Function Sets or queries the averaging type.
Syntax
```
:MEASure:AVERaging:TYPE {EXPonent|
LINear}
:MEASure:AVERaging:TYPE?
```
Example
```
:MEASURE:AVERAGING:TYPE EXPONENT
:MEASURE:AVERAGING:TYPE? ->
:MEASURE:AVERAGING:TYPE EXPONENT
```
Description The averaging of harmonic measurement functions (option) is only valid when the type is set to EXPonent. For details, see the features guide, IM WT1801-01EN.

:MEASure:DMeasure?
Function Queries all delta computation settings.
Syntax `:MEASure:DMeasure?`
Description This command is only valid on models with the delta computation (/DT) option.

:MEASure:DMeasure:MODE
Function Sets or queries the voltage or current mode that is used in delta computation.
Syntax
```
:MEASure:DMeasure:MODE {RMS|MEAN|
DC|RMEAN|AC}
:MEASure:DMeasure:MODE?
```
Example
```
:MEASURE:DMEASURE:MODE RMS
:MEASURE:DMEASURE:MODE? ->
:MEASURE:DMEASURE:MODE RMS
```
Description This command is only valid on models with the delta computation (/DT) option.

:MEASure:DMeasure:{SIGMA|SIGMB|SIGMC}
Function Sets or queries the delta computation mode for wiring unit ΣA, ΣB, or ΣC.
Syntax
```
:MEASure:DMeasure:{SIGMA|SIGMB|
SIGMC} {OFF|DIFFerence|P3W3_V3A3|
ST_DT|DT_ST}
:MEASure:DMeasure:{SIGMA|SIGMB|
SIGMC}?
```
Example
```
:MEASURE:DMEASURE:SIGMA OFF
:MEASURE:DMEASURE:SIGMA? ->
:MEASURE:DMEASURE:SIGMA OFF
```
Description
- This command is only valid on models with the delta computation (/DT) option.
- The available options are explained below. The modes that can be selected vary depending on the wiring system of the specified wiring unit (ΣA, ΣB, or ΣC).
  OFF = No delta computation (only selectable with a single-phase, two-wire system—1P2W)
  DIFFerence = Differential voltage, differential current (only selectable with a single-phase, three-wire system—1P3W—or a three-phase, three-wire system—3P3W)
  P3W3_V3A3 = 3P3W-to-3V3A conversion (only selectable with a single-phase, three-wire system—1P3W—or a three-phase, three-wire system—3P3W)
  ST_DT = Star-to-delta conversion (only selectable with a three-phase, four-wire system—3P4W)
  DT_ST = Delta-to-star conversion (only selectable with a three-phase, three-wire system that uses the three-voltage, three current method—3P3W(3V3A))

:MEASure:EFFiciency?

Function Queries all efficiency computation settings.

Syntax
```
:MEASure:EFFiciency?
```

:MEASure:EFFiciency:ETA<x>

Function Sets or queries the efficiency equation.

Syntax
```
:MEASure:EFFiciency:ETA<x>
{(OFF|P<x>|PA|PB|PC|PM|UDEF<x>)
[,(OFF|P<x>|PA|PB|PC|PM|UDEF<x>)]}
:MEASure:EFFiciency:ETA<x>?
ETA<x>'s <x> = 1 to 4 (η1 to η4)
OFF = No computation
P<x>'s <x> = 1 to 6 (element)
PA, PB, PC = PΣA, PΣB, PΣC (the
available options vary depending on
the number of elements)
PM = Pm (motor output, only on
models with the motor evaluation
function [/MTR] option)
UDEF<x>'s <x> = 1 or 2 (Udef1 or
Udef2)
```

Example
```
:MEASURE:EFFICIENCY:ETA1 P3,PA
:MEASURE:EFFICIENCY:ETA1? ->
:MEASURE:EFFICIENCY:ETA1 P3,PA
```

Description
- Set the numerator and then the denominator.
- The denominator can be omitted. The denominator is set to OFF when it is omitted.
- The denominator is omitted from the response to a query when it is OFF.

:MEASure:EFFiciency:UDEF<x>

Function Sets or queries the user-defined parameters used in the efficiency equation.

Syntax
```
:MEASure:EFFiciency:UDEF<x>
{(NONE|P<x>|PA|PB|PC|PM)
[,(NONE|P<x>|PA|PB|PC|PM)]
[,(NONE|P<x>|PA|PB|PC|PM)]
[,(NONE|P<x>|PA|PB|PC|PM)]}
:MEASure:EFFiciency:UDEF<x>?
UDEF<x>'s <x> = 1 or 2 (Udef1 or
Udef2)
NONE = No operand
P<x>'s <x> = 1 to 6 (element)
PA, PB, PC = PΣA, PΣB, PΣC (the
available options vary depending on
the number of elements)
PM = Pm (motor output, only on
models with the motor evaluation
function [/MTR] option)
```

Example
```
:MEASURE:EFFICIENCY:UDEF1 P1,P2,P3
:MEASURE:EFFICIENCY:UDEF1? ->
:MEASURE:EFFICIENCY:UDEF1 P1,P2,P3
```

Description
- Set the parameters in ascending order.
- Parameters 2 to 4 can be omitted. Omitted parameters are set to NONE.
- Parameters 2 to 4 are omitted from the response to a query if all the subsequent parameters are NONE.

:MEASure:EVENt<x>?

Function Queries all the settings of the specified user-defined event.

Syntax
```
:MEASure:EVENt<x>?
<x> = 1 to 8 (Event1 to Event8)
```

:MEASure:EVENt<x>:EXPRession?

Function Queries all the settings of the specified user-defined event's expression.

Syntax
```
:MEASure:EVENt<x>:EXPRession?
<x> = 1 to 8 (Event1 to Event8)
```

:MEASure:EVENt<x>:EXPRession:CONDition

Function Sets or queries the specified user-defined event's expression (compound condition type).

Syntax
```
:MEASure:EVENt<x>:EXPRession:
CONDition {<Event>[,<Logic>,<Event>]
[,<Logic>,<Event>]...}
:MEASure:EVENt<x>:EXPRession:
CONDition?
<x> = 1 to 8 (Event1 to Event8)
<Event> = {<NRf>} (<NRf) = 1 to 8
(Event1 to Event8))
<Logic> = {AND|OR}
```

Example
```
:MEASURE:EVENT1:EXPRESSION:
CONDITION 1,AND,2
:MEASURE:EVENT1:EXPRESSION:
CONDITION? ->
:MEASURE:EVENT1:EXPRESSION:
CONDITION 1,AND,2
```

Description This command is valid when the expression type (:MEASure:EVENt<x>:EXPRession:TYPE) is set to CONDition.

:MEASure:EVENt<x>:EXPRession:INVerse

Function Sets or queries the on/off status of the logic inversion of the specified user-defined event's expression (compound condition type).

Syntax
```
:MEASure:EVENt<x>:EXPRession:
INVerse {<Boolean>}
:MEASure:EVENt<x>:EXPRession:
INVerse?
<x> = 1 to 8 (Event1 to Event8)
```

Example
```
:MEASURE:EVENT1:EXPRESSION:
INVERSE OFF
:MEASURE:EVENT1:EXPRESSION:
INVERSE? ->
:MEASURE:EVENT1:EXPRESSION:INVERSE 0
```

Description This command is valid when the expression type (:MEASure:EVENt<x>:EXPRession:TYPE) is set to CONDition.

:MEASure:EVENt<x>:EXPRession:ITEM

Function Sets or queries the target item of the specified user-defined event's expression (range-defined type).

Syntax
```
:MEASure:EVENt<x>:EXPRession:ITEM
{<Function>[,<Element>][,<Order>]}
:MEASure:EVENt<x>:EXPRession:ITEM?
<x> = 1 to 8 (Event1 to Event8)
<Function> = {URMS|IRMS|P|S|Q|...}
<Element> = {<NRf>|SIGMA|SIGMB|
SIGMC}(<NRf> = 1 to 6)
<Order> = {TOTal|DC|<NRf>}
(<NRf> = 1 to 500)
```

Example
```
:MEASURE:EVENT1:EXPRESSION:
ITEM URMS,1
:MEASURE:EVENT1:EXPRESSION:ITEM? ->
:MEASURE:EVENT1:EXPRESSION:
ITEM URMS,1
```

Description
- This command is valid when the expression type (:MEASure:EVENt<x>:EXPRession: TYPE) is set to RANGe.
- For information about the options available for <Function>, see Function Option List (1), in the DISPlay Group section on page 5-37.
- If <Element> is omitted, the element is set to 1.
- If <Order> is omitted, the order is set to TOTal.
- <Element> and <Order> are omitted from responses to functions that do not need them.

:MEASure:EVENt<x>:EXPRession:LIMit<x>

Function Sets or queries the range of the specified user-defined event's expression (range-defined type).

Syntax
```
:MEASure:EVENt<x>:EXPRession:
LIMit<x> {<Operand>,<NRf>}
:MEASure:EVENt<x>:EXPRession:
LIMit<x>?
EVENt<x>'s <x> = 1 to 8 (Event1
to Event8)
LIMit<x>'s <s> = 1 or 2
<Operand> = {OFF|LESS|LEQual|EQual|
GReat|GEQual|NEQual}
<NRf> = -1.0000E+12 to 1.0000E+12
```

Example
```
:MEASURE:EVENT1:EXPRESSION:
LIMIT1 LESS,100
:MEASURE:EVENT1:EXPRESSION:LIMIT1?
-> :MEASURE:EVENT1:EXPRESSION:
LIMIT1 LESS,100.00E+00
:MEASURE:EVENT1:EXPRESSION:LIMIT2 OFF
:MEASURE:EVENT1:EXPRESSION:LIMIT2? ->
:MEASURE:EVENT1:EXPRESSION:LIMIT2 OFF
```

Description
- This command is valid when the expression type (:MEASure:EVENt<x>:EXPRession: TYPE) is set to RANGe.
- When <Operand> is set to OFF, <NRf> can be omitted.

:MEASure:EVENt<x>:EXPRession:STRing?

Function Queries the specified user-defined event's expression as a string.

Syntax
```
:MEASure:EVENt<x>:EXPRession:STRing?
<x> = 1 to 8 (Event1 to Event8)
```

Example
```
:MEASURE:EVENT1:EXPRESSION:STRING? ->
"TEMP < 100.00000"
```

Description If there is no expression, "No Expression" is returned.

:MEASure:EVENt<x>:EXPRession:TYPE

Function Sets or queries the specified user-defined event's expression type.

Syntax
```
:MEASure:EVENt<x>:EXPRession:
TYPE {RANGe|CONDition}
:MEASure:EVENt<x>:EXPRession:TYPE?
<x> = 1 to 8 (Event1 to Event8)
RANGe = Range-defined type
CONDition = Compound event type
```

Example
```
:MEASURE:EVENT1:EXPRESSION:
TYPE RANGE
:MEASURE:EVENT1:EXPRESSION:TYPE? ->
:MEASURE:EVENT1:EXPRESSION:
TYPE RANGE
```

:MEASure:EVENt<x>:FLABel

Function Sets or queries the string that is displayed when the specified user-defined event's condition is not met.

Syntax
```
:MEASure:EVENt<x>:FLABel {<String>}
:MEASure:EVENt<x>:FLABel?
<x> = 1 to 8 (Event1 to Event8)
<String> = Up to 6 characters
```

Example
```
:MEASURE:EVENT1:FLABEL "False"
:MEASURE:EVENT1:FLABEL? ->
:MEASURE:EVENT1:FLABEL "False"
```

:MEASure:EVENt<x>:NAME

Function Sets or queries the specified user-defined event's name.

Syntax
```
:MEASure:EVENt<x>:NAME {<String>}
:MEASure:EVENt<x>:NAME?
<x> = 1 to 8 (Event1 to Event8)
```
<String> = Up to 8 characters

Example
```
:MEASURE:EVENT1:NAME "Ev1"
:MEASURE:EVENT1:NAME? ->
:MEASURE:EVENT1:NAME "Ev1"
```

:MEASure:EVENt<x>[:STATe]

Function Sets or queries the on/off status of the specified user-defined event.

Syntax
```
:MEASure:EVENt<x>[:
STATe] {<Boolean>}
:MEASure:EVENt<x>:STATe?
<x> = 1 to 8 (Event1 to Event8)
```

Example
```
:MEASURE:EVENT1:STATE ON
:MEASURE:EVENT1:STATE? ->
:MEASURE:EVENT1:STATE 1
```

:MEASure:EVENt<x>:TLABel

Function Sets or queries the string that is displayed when the specified user-defined event's condition is met.

Syntax
```
:MEASure:EVENt<x>:TLABel {<String>}
:MEASure:EVENt<x>:TLABel?
<x> = 1 to 8 (Event1 to Event8)
<String> = Up to 6 characters
```

Example
```
:MEASURE:EVENT1:TLABEL "True"
:MEASURE:EVENT1:TLABEL? ->
:MEASURE:EVENT1:TLABEL "True"
```

:MEASure:FREQuency?

Function Queries all frequency measurement settings.

Syntax
```
:MEASure:FREQuency?
```

Description On models with the add-on frequency measurement (/FQ) option, all input elements can be measured simultaneously, so it is not necessary to use this query.

:MEASure:FREQuency:ITEM<x>

Function Sets or queries the element whose frequency will be measured.

Syntax
```
:MEASure:FREQuency:ITEM<x> {U<x>|
I<x>}
:MEASure:FREQuency:ITEM<x>?
ITEM<x>'s <x> = 1 to 3 (Freq.1 to
Freq.3)
U<x> and I<x>'s <x> = 1 to 6 (element)
```

Example
```
:MEASURE:FREQUENCY:ITEM1 U1
:MEASURE:FREQUENCY:ITEM1? ->
:MEASURE:FREQUENCY:ITEM1 U1
```

Description On models with the add-on frequency measurement (/FQ) option, all input elements can be measured simultaneously, so it is not necessary to use this command to set the element.

:MEASure:FUNCtion<x>?

Function Queries all the settings of the specified user-defined function.

Syntax
```
:MEASure:FUNCtion<x>?
<x> = 1 to 20 (F1 to F20)
```

:MEASure:FUNCtion<x>:EXPRession

Function Sets or queries the equation of the specified user-defined function.

Syntax
```
:MEASure:FUNCtion<x>:
EXPRession {<String>}
:MEASure:FUNCtion<x>:EXPRession?
<x> = 1 to 20 (F1 to F20)
<String> = Up to 50 characters
```

Example
```
:MEASURE:FUNCTION1:
EXPRESSION "WH(E1)/TI(E1)*3600"
:MEASURE:FUNCTION1:EXPRESSION? ->
:MEASURE:FUNCTION1:
EXPRESSION "WH(E1)/TI(E1)*3600"
```

:MEASure:FUNCtion<x>:NAME

Function Sets or queries the name of the specified user-defined function.

Syntax
```
:MEASure:FUNCtion<x>:NAME {<String>}
:MEASure:FUNCtion<x>:NAME?
<x> = 1 to 20 (F1 to F20)
<String> = Up to 8 characters
```

Example
```
:MEASURE:FUNCTION1:NAME "F1"
:MEASURE:FUNCTION1:NAME? ->
:MEASURE:FUNCTION1:NAME "F1"
```

:MEASure:FUNCtion<x>[:STATe]

Function Sets or queries the on/off status of the specified user-defined function.

Syntax
```
:MEASure:FUNCtion<x>[:
STATe] {<Boolean>}
:MEASure:FUNCtion<x>:STATe?
<x> = 1 to 20 (F1 to F20)
```

Example
```
:MEASURE:FUNCTION1:STATE ON
:MEASURE:FUNCTION1:STATE? ->
:MEASURE:FUNCTION1:STATE 1
```

:MEASure:FUNCtion<x>:UNIT

Function Sets or queries the unit that is added to the computation result of the specified user-defined function.

Syntax
```
:MEASure:FUNCtion<x>:UNIT {<String>}
:MEASure:FUNCtion<x>:UNIT?
<x> = 1 to 20 (F1 to F20)
<String> = Up to 8 characters
```

Example
```
:MEASURE:FUNCTION1:UNIT "W"
:MEASURE:FUNCTION1:UNIT? ->
:MEASURE:FUNCTION1:UNIT "W"
```

Description This command has no effect on the computation result.

:MEASure:MHOLd

Function Sets or queries the on/off status of the MAX HOLD feature used in user-defined functions.

Syntax
```
:MEASure:MHOLd {<Boolean>}
:MEASure:MHOLd?
```

Example
```
:MEASURE:MHOLD ON
:MEASURE:MHOLD? ->
:MEASURE:MHOLD 1
```

Description
- The MAX HOLD operation starts when the MAX HOLD feature is specified by a user-defined function and :MEASure:MHOLd is set to ON.
- When :MEASure:MHOLd is set to OFF, the MAX HOLD operation ends, and the MAX HOLD value becomes "no data."
- If :MEASure:MHOLd is set to ON after having already been set to ON before, the MAX HOLD value is reset, and the MAX HOLD operation starts again.
- For information about specifying the MAX HOLD feature, see the features guide, IM WT1801-01EN.

:MEASure:PC?

Function Queries all Pc (Corrected Power) computation settings.

Syntax
```
:MEASure:PC?
```

:MEASure:PC:IEC

Function Sets or queries the Pc (Corrected Power) equation.

Syntax
```
:MEASure:PC:IEC {<NRf>}
:MEASure:PC:IEC?
<NRf> = 1976, 1993
```

Example
```
:MEASURE:PC:IEC 1976
:MEASURE:PC:IEC? ->
:MEASURE:PC:IEC 1976
```

Description Specify the publication year of the IEC76-1 in which the Pc equation that you want to use was written.

:MEASure:PC:P<x>

Function Sets or queries a Pc (Corrected Power) equation parameter.

Syntax
```
:MEASure:PC:P<x> {<NRf>}
:MEASure:PC:P<x>?
<x> = 1, 2 (P1, P2)
<NRf> = 0.0001 to 9.9999
```

Example
```
:MEASURE:PC:P1 0.5
:MEASURE:PC:P1? -> :MEASURE:PC:
P1 0.5000
```

Description These parameters are used when :MEASure:PC: IEC is set to 1976 (IEC76-1 1976).

:MEASure:PHASe

Function Sets or queries the display format of the phase difference.

Syntax
```
:MEASure:PHASe {<NRf>}
:MEASure:PHASe?
<NRf> = 180, 360
```

Example
```
:MEASURE:PHASE 180
:MEASURE:PHASE? ->
:MEASURE:PHASE 180
```

Description When 180 is selected, the phase is displayed using 0 to ±180° (Lead/Lag). When 360 is selected, the phase is displayed using 0° to 360°.

:MEASure:SAMPling

Function Sets or queries the sampling frequency.

Syntax
```
:MEASure:SAMPling
{AUTO|CLKA|CLKB|CLKC}
:MEASure:SAMPling?
```

Example
```
:MEASURE:SAMPLING AUTO
:MEASURE:SAMPLING? ->
:MEASURE:SAMPLING AUTO
```

Description For details on the available sampling frequencies, see the features guide, IM WT1801-01EN.

:MEASure:SFORmula

Function Sets or queries the equation used to compute S (apparent power).

Syntax
```
:MEASure:SFORmula {RMS|MEAN|DC|
MRMS|RMEAN}
:MEASure:SFORmula?
```

Example
```
:MEASURE:SFORMULA RMS
:MEASURE:SFORMULA? ->
:MEASURE:SFORMULA RMS
```

Description
```
The equations that correspond to
each option are as follows:
RMS: S = Urms*Irms
MEAN: S = Umean*Imean
DC: S = Udc*Idc
MRMS: S = Umean*Irms
RMEAN: S = Urmean*Irmean
```

:MEASure:SQFormula

Function Sets or queries the equation used to compute S (apparent power) and Q (reactive power).

Syntax
```
:MEASure:SQFormula {TYPE1|TYPE2|
TYPE3}
:MEASure:SQFormula?
```

Example
```
:MEASURE:SQFORMULA TYPE1
:MEASURE:SQFORMULA? ->
:MEASURE:SQFORMULA TYPE1
```

Description
- For details on the equations available for TYPE1, TYPE2, or TYPE3, see the features guide, IM WT1801-01EN.
- TYPE3 can only be selected on models with the harmonic measurement (/G5 or /G6) option.

:MEASure:SYNChronize

Function Sets or queries the synchronized measurement mode.

Syntax
```
:MEASure:SYNChronize {MASTer|SLAVe}
:MEASure:SYNChronize?
```

Example
```
:MEASURE:SYNCHRONIZE MASTER
:MEASURE:SYNCHRONIZE? ->
:MEASURE:SYNCHRONIZE MASTER
```

5.15 MOTor Group

The commands in this group deal with the motor evaluation function.
You can make the same settings and queries that you can make by pressing MOTOR/AUX SET (SHIFT+SCALING) on the front panel.
The commands in this group are only valid on models with the motor evaluation function (/MTR) option.

:MOTor?
Function Queries all motor evaluation function settings.
Syntax :MOTor?

:MOTor:EANGle?
Function Queries all electrical angle measurement settings.
Syntax :MOTor:EANGle?
Description The electrical angle measurement feature is only available on models with the harmonic measurement (/G5 or /G6) option.

:MOTor:EANGle:CORRection?
Function Queries all electrical angle correction settings.
Syntax :MOTor:EANGle:CORRection?

:MOTor:EANGle:CORRection:AENTer?
Function Queries all automatic electrical angle correction entry settings.
Syntax :MOTor:EANGle:CORRection:AENTer?

:MOTor:EANGle:CORRection:AENTer[:EXECute]
Function Executes an automatic electrical angle correction entry.
Syntax :MOTor:EANGle:CORRection:AENTer[:EXECute]
Example :MOTOR:EANGLE:CORRECTION:AENTER:EXECUTE
Description The measured electrical angle of the target source (:MOTor:EANGle:CORRection:AENTer:TARGet) is entered as the correction value.

:MOTor:EANGle:CORRection:AENTer:TARGet
Function Sets or queries the target source for automatically entering the electrical angle correction value.
Syntax :MOTor:EANGle:CORRection:AENTer:TARGet {U<x>|I<x>}
:MOTor:EANGle:CORRection:AENTer:TARGet?
<x> = 1 to 6 (element)
Example :MOTOR:EANGLE:CORRECTION:AENTER:TARGET U1
:MOTOR:EANGLE:CORRECTION:AENTER:TARGET? ->
:MOTOR:EANGLE:CORRECTION:AENTER:TARGET U1

:MOTor:EANGle:CORRection:CLEar
Function Clears the electrical angle correction value.
Syntax :MOTor:EANGle:CORRection:CLEar
Example :MOTOR:EANGLE:CORRECTION:CLEAR

:MOTor:EANGle:CORRection[:VALue]
Function Sets or queries the electrical angle correction value.
Syntax :MOTor:EANGle:CORRection[:VALue] {<NRf>}
:MOTor:EANGle:CORRection:VALue?
<NRf> = -180.00 to 180.00
Example :MOTOR:EANGLE:CORRECTION:VALUE 0
:MOTOR:EANGLE:CORRECTION:VALUE? ->
:MOTOR:EANGLE:CORRECTION:VALUE 0.00

:MOTor:EANGle[:STATe]
Function Sets or queries the on/off status of electrical angle measurement.
Syntax :MOTor:EANGle[:STATe] {<Boolean>}
:MOTor:EANGle:STATe?
Example :MOTOR:EANGLE:STATE ON
:MOTOR:EANGLE:STATE? ->
:MOTOR:EANGLE:STATE 1

:MOTor:FILTer?
Function Queries all input filter settings.
Syntax :MOTor:FILTer?

:MOTor:FILTer[:LINE]
Function Sets or queries the line filter.
Syntax :MOTor:FILTer[:LINE] {OFF|<Frequency>}
:MOTor:FILTer:LINE?
OFF = Line filter off
<Frequency> = 100 Hz, 1 kHz (line filter on; cutoff frequency)
Example :MOTOR:FILTER:LINE OFF
:MOTOR:FILTER:LINE? ->
:MOTOR:FILTER:LINE OFF

:MOTor:PM?
Function Queries all motor output (Pm) settings.
Syntax :MOTor:PM?

:MOTor:PM:SCALing

Function Sets or queries the motor output computation scaling factor.

Syntax
```
:MOTor:PM:SCALing {<NRf>}
:MOTor:PM:SCALing?
<NRf> = 0.0001 to 99999.9999
```

Example
```
:MOTOR:PM:SCALING 1
:MOTOR:PM:SCALING? ->
:MOTOR:PM:SCALING 1.0000
```

:MOTor:PM:UNIT

Function Sets or queries the unit that is added to the motor output computation result.

Syntax
```
:MOTor:PM:UNIT {<String>}
:MOTor:PM:UNIT?
<String> = Up to 8 characters
```

Example
```
:MOTOR:PM:UNIT "W"
:MOTOR:PM:UNIT? ->
:MOTOR:PM:UNIT "W"
```

Description This command has no effect on the computation result.

:MOTor:POLE

Function Sets or queries the motor's number of poles.

Syntax
```
:MOTor:POLE {<NRf>}
:MOTor:POLE?
<NRf> = 1 to 99
```

Example
```
:MOTOR:POLE 2
:MOTOR:POLE? ->
:MOTOR:POLE 2
```

:MOTor:SPEed?

Function Queries all rotating speed (Speed) settings.

Syntax
```
:MOTor:SPEed?
```

:MOTor:SPEed:AUTO

Function Sets or queries the voltage auto range on/off status of the revolution signal (analog input type).

Syntax
```
:MOTor:SPEed:AUTO {<Boolean>}
:MOTor:SPEed:AUTO?
```

Example
```
:MOTOR:SPEED:AUTO ON
:MOTOR:SPEED:AUTO? ->
:MOTOR:SPEED:AUTO 1
```

Description This command is valid when the revolution signal input type (:MOTor:SPEed:TYPE) is set to ANALog (analog input).

:MOTor:SPEed:LSCale?

Function Queries all revolution signal (analog input type) linear scaling settings.

Syntax
```
:MOTor:SPEed:LSCale?
```

Description Linear scaling settings are valid when the revolution signal input type (:MOTor:SPEed:TYPE) is set to ANALog (analog input).

:MOTor:SPEed:LSCale:AVALue

Function Sets or queries the slope (A) of the linear scale of the revolution signal (analog input type).

Syntax
```
:MOTor:SPEed:LSCale:AVALue {<NRf>}
:MOTor:SPEed:LSCale:AVALue?
<NRf> = 1.000E-03 to 1.000E+06
```

Example
```
:MOTOR:SPEED:LSCALE:AVALUE 1.000
:MOTOR:SPEED:LSCALE:AVALUE? ->
:MOTOR:SPEED:LSCALE:AVALUE 1.000E+00
```

:MOTor:SPEed:LSCale:BVALue

Function Sets or queries the offset (B) of the linear scale of the revolution signal (analog input type).

Syntax
```
:MOTor:SPEed:LSCale:BVALue {<NRf>}
:MOTor:SPEed:LSCale:BVALue?
<NRf> = -1.000E+06 to 1.000E+06
```

Example
```
:MOTOR:SPEED:LSCALE:BVALUE 0
:MOTOR:SPEED:LSCALE:BVALUE? ->
:MOTOR:SPEED:LSCALE:BVALUE 0.000E+00
```

:MOTor:SPEed:LSCale:CALCulate?

Function Queries all parameter calculation settings for the linear scale of the revolution signal (analog input type).

Syntax
```
:MOTor:SPEed:LSCale:CALCulate?
```

:MOTor:SPEed:LSCale:CALCulate:{P1X|P1Y|P2X|P2Y}

Function Sets or queries the data (Point1X, Point1Y, Point2X, or Point2Y) for parameter calculations of the linear scale of the revolution signal (analog input type).

Syntax
```
:MOTor:SPEed:LSCale:CALCulate:
{P1X|P1Y|P2X|P2Y} {<NRf>}
:MOTor:SPEed:LSCale:CALCulate:
{P1X|P1Y|P2X|P2Y}?
<NRf> = -1.000E+12 to 1.000E+12
```

Example
```
:MOTOR:SPEED:LSCALE:CALCULATE:P1X 0
:MOTOR:SPEED:LSCALE:CALCULATE:
P1X? ->
:MOTOR:SPEED:LSCALE:CALCULATE:
P1X 0.000E+00
```

:MOTor:SPEed:LSCale:CALCulate:EXECute

Function Calculates parameters for the linear scale of the revolution signal (analog input type).

Syntax
```
:MOTor:SPEed:LSCale:CALCulate:
EXECute
```

Example
```
:MOTOR:SPEED:LSCALE:CALCULATE:
EXECUTE
```

Description The WT1800 uses the data that has been specified (Point1X, Point1Y, Point2X, and Point2Y) to calculate and set the slope (A) and offset (B) of the linear scale.

:MOTor:SPEed:PRANge

Function Sets or queries the range of the revolution signal (pulse input type).

Syntax
```
:MOTor:SPEed:PRANge {<NRf>,<NRf>}
:MOTor:SPEed:PRANge?
<NRf> = 0.0000 to 99999.9999
```

Example
```
:MOTOR:SPEED:PRANGE 10000,0
:MOTOR:SPEED:PRANGE? ->
:MOTOR:SPEED:PRANGE 10000.0000,
0.0000
```

Description
- Set the upper limit and then the lower limit.
- This command is valid when the revolution signal input type (:MOTor:SPEed:TYPE) is set to PULSe (pulse input).

:MOTor:SPEed:PULSe

Function Sets or queries the number of pulses of the revolution signal (pulse input type).

Syntax
```
:MOTor:SPEed:PULSe {<NRf>}
:MOTor:SPEed:PULSe?
<NRf> = 1 to 9999
```

Example
```
:MOTOR:SPEED:PULSE 60
:MOTOR:SPEED:PULSE? ->
:MOTOR:SPEED:PULSE 60
```

Description This command is valid when the revolution signal input type (:MOTor:SPEed:TYPE) is set to PULSe (pulse input).

:MOTor:SPEed:RANGe

Function Sets or queries the voltage range of the revolution signal (analog input type).

Syntax
```
:MOTor:SPEed:RANGe {<Voltage>}
:MOTor:SPEed:RANGe?
<Voltage> = 1 V, 2 V, 5 V, 10 V,
20 V
```

Example
```
:MOTOR:SPEED:RANGE 20V
:MOTOR:SPEED:RANGE? ->
:MOTOR:SPEED:RANGE 20.0E+00
```

Description This command is valid when the revolution signal input type (:MOTor:SPEed:TYPE) is set to ANALog (analog input).

:MOTor:SPEed:SCALing

Function Sets or queries the rotating speed computation scaling factor.

Syntax
```
:MOTor:SPEed:SCALing {<NRf>}
:MOTor:SPEed:SCALing?
<NRf> = 0.0001 to 99999.9999
```

Example
```
:MOTOR:SPEED:SCALING 1
:MOTOR:SPEED:SCALING? ->
:MOTOR:SPEED:SCALING 1.0000
```

:MOTor:SPEed:TYPE

Function Sets or queries the revolution signal input type.

Syntax
```
:MOTor:SPEed:TYPE {ANALog|PULSe}
:MOTor:SPEed:TYPE?
```

Example
```
:MOTOR:SPEED:TYPE ANALOG
:MOTOR:SPEED:TYPE? ->
:MOTOR:SPEED:TYPE ANALOG
```

:MOTor:SPEed:UNIT

Function Sets or queries the unit that is added to the rotating speed computation result.

Syntax
```
:MOTor:SPEed:UNIT {<String>}
:MOTor:SPEed:UNIT?
<String> = Up to 8 characters
```

Example
```
:MOTOR:SPEED:UNIT "rpm"
:MOTOR:SPEED:UNIT? ->
:MOTOR:SPEED:UNIT "rpm"
```

Description This command has no effect on the computation result.

:MOTor:SSPeed

Function Sets or queries the frequency measurement source for the synchronous speed (SyncSp) computation.

Syntax
```
:MOTor:SSPeed {U<x>|I<x>}
:MOTor:SSPeed?
<x> = 1 to 6 (element)
```

Example
```
:MOTOR:SSPEED I1
:MOTOR:SSPEED? ->
:MOTOR:SSPEED I1
```

:MOTor:SYNChronize

Function Sets or queries the synchronization source for the rotating speed (Speed) and torque (Torque) computations.

Syntax
```
:MOTor:SYNChronize {U<x>|I<x>|
EXTernal|NONE}
:MOTor:SYNChronize?
<x> = 1 to 6 (element)
EXTernal = External clock input (Ext
Clk)
NONE = No synchronization source
```

Example
```
:MOTOR:SYNCHRONIZE NONE
:MOTOR:SYNCHRONIZE? ->
:MOTOR:SYNCHRONIZE NONE
```

:MOTor:TORQue?

Function Queries all torque (Torque) settings.

Syntax
```
:MOTor:TORQue?
```

:MOTor:TORQue:AUTO

Function Sets or queries the voltage auto range on/off status of the torque signal (analog input type).

Syntax
```
:MOTor:TORQue:AUTO {<Boolean>}
:MOTor:TORQue:AUTO?
```

Example
```
:MOTOR:TORQUE:AUTO ON
:MOTOR:TORQUE:AUTO? ->
:MOTOR:TORQUE:AUTO 1
```

Description This command is valid when the torque signal input type (:MOTor:TORQue:TYPE) is set to ANALog (analog input).

:MOTor:TORQue:LSCale?

Function Queries all torque signal (analog input type) linear scaling settings.

Syntax
```
:MOTor:TORQue:LSCale?
```

Description Linear scaling settings are valid when the torque signal input type (:MOTor:TORQue:TYPE) is set to ANALog (analog input).

:MOTor:TORQue:LSCale:AVALue

Function Sets or queries the slope (A) of the linear scale of the torque signal (analog input type).

Syntax
```
:MOTor:TORQue:LSCale:AVALue {<NRf>}
:MOTor:TORQue:LSCale:AVALue?
<NRf> = 1.000E-03 to 1.000E+06
```

Example
```
:MOTOR:TORQUE:LSCALE:AVALUE 1.000
:MOTOR:TORQUE:LSCALE:AVALUE? ->
:MOTOR:TORQUE:LSCALE:
AVALUE 1.000E+00
```

:MOTor:TORQue:LSCale:BVALue

Function Sets or queries the offset (B) of the linear scale of the torque signal (analog input type).

Syntax
```
:MOTor:TORQue:LSCale:BVALue {<NRf>}
:MOTor:TORQue:LSCale:BVALue?
<NRf> = -1.000E+06 to 1.000E+06
```

Example
```
:MOTOR:TORQUE:LSCALE:BVALUE 0
:MOTOR:TORQUE:LSCALE:BVALUE? ->
:MOTOR:TORQUE:LSCALE:
BVALUE 0.000E+00
```

:MOTor:TORQue:LSCale:CALCulate?

Function Queries all parameter calculation settings for the linear scale of the torque signal (analog input type).

Syntax
```
:MOTor:TORQue:LSCale:CALCulate?
```

:MOTor:TORQue:LSCale:CALCulate:{P1X|P1Y|P2X|P2Y}

Function Sets or queries the data (Point1X, Point1Y, Point2X, or Point2Y) for parameter calculations of the linear scale of the torque signal (analog input type).

Syntax
```
:MOTor:TORQue:LSCale:CALCulate:
{P1X|P1Y|P2X|P2Y} {<NRf>}
:MOTor:TORQue:LSCale:CALCulate:
{P1X|P1Y|P2X|P2Y}?
<NRf> = -1.000E+12 to 1.000E+12
```

Example
```
:MOTOR:TORQUE:LSCALE:CALCULATE:P1X 0
:MOTOR:TORQUE:LSCALE:CALCULATE:
P1X? ->
:MOTOR:TORQUE:LSCALE:CALCULATE:
P1X 0.000E+00
```

:MOTor:TORQue:LSCale:CALCulate:EXECute

Function Calculates parameters for the linear scale of the torque signal (analog input type).

Syntax
```
:MOTor:TORQue:LSCale:CALCulate:
EXECute
```

Example
```
:MOTOR:TORQUE:LSCALE:CALCULATE:
EXECUTE
```

Description The WT1800 uses the data that has been specified (Point1X, Point1Y, Point2X, and Point2Y) to calculate and set the slope (A) and offset (B) of the linear scale.

:MOTor:TORQue:PRANge

Function Sets or queries the range of the torque signal (pulse input type).

Syntax
```
:MOTor:TORQue:PRANge {<NRf>,<NRf>}
:MOTor:TORQue:PRANge?
<NRf> = -10000.0000 to 10000.0000
```

Example
```
:MOTOR:TORQUE:PRANGE 50,-50
:MOTOR:TORQUE:PRANGE? ->
:MOTOR:TORQUE:PRANGE 50.0000,
-50.0000
```

Description
- Set the upper limit and then the lower limit.
- This command is valid when the torque signal input type (:MOTor:TORQue:TYPE) is set to PULSe (pulse input).

:MOTor:TORQue:RANGe

Function Sets or queries the voltage range of the torque signal (analog input type).

Syntax
```
:MOTor:TORQue:RANGe {<Voltage>}
:MOTor:TORQue:RANGe?
<Voltage> = 1 V, 2 V, 5 V, 10 V,
20 V
```

Example
```
:MOTOR:TORQUE:RANGE 20V
:MOTOR:TORQUE:RANGE? ->
:MOTOR:TORQUE:RANGE 20.0E+00
```

Description This command is valid when the torque signal input type (:MOTor:TORQue:TYPE) is set to ANALog (analog input).

:MOTor:TORQue:RATE?

Function Queries all torque signal (pulse input type) rated-value settings.

Syntax
```
:MOTor:TORQue:RATE?
```

:MOTor:TORQue:RATE:{UPPer|LOWer}

Function Sets or queries the upper or lower limit of the rated value of the torque signal (pulse input type).

Syntax
```
:MOTor:TORQue:RATE:{UPPer|LOWer}
{<NRf>,<Frequency>}
:MOTor:TORQue:RATE:{UPPer|LOWer}?
<NRf> = -10000.0000 to 10000.0000
<Frequency> = 1 Hz to 100 MHz
```

Example
```
:MOTOR:TORQUE:RATE:UPPER 50,15KHZ
:MOTOR:TORQUE:RATE:UPPER? ->
:MOTOR:TORQUE:RATE:UPPER 50.0000,
15.000E+03
```

Description This command is valid when the torque signal input type (:MOTor:TORQue:TYPE) is set to PULSe (pulse input).

:MOTor:TORQue:SCALing

Function Sets or queries the torque computation scaling factor.

Syntax
```
:MOTor:TORQue:SCALing {<NRf>}
:MOTor:TORQue:SCALing?
<NRf> = 0.0001 to 99999.9999
```

Example
```
:MOTOR:TORQUE:SCALING 1
:MOTOR:TORQUE:SCALING? ->
:MOTOR:TORQUE:SCALING 1.0000
```

:MOTor:TORQue:TYPE

Function Sets or queries the torque signal input type.

Syntax
```
:MOTor:TORQue:TYPE {ANALog|PULSe}
:MOTor:TORQue:TYPE?
```

Example
```
:MOTOR:TORQUE:TYPE ANALOG
:MOTOR:TORQUE:TYPE? ->
:MOTOR:TORQUE:TYPE ANALOG
```

:MOTor:TORQue:UNIT

Function Sets or queries the unit that is added to the torque computation result.

Syntax
```
:MOTor:TORQue:UNIT {<String>}
:MOTor:TORQue:UNIT?
<String> = Up to 8 characters
```

Example
```
:MOTOR:TORQUE:UNIT "Nm"
:MOTOR:TORQUE:UNIT? ->
:MOTOR:TORQUE:UNIT "Nm"
```

Description This command has no effect on the computation result.

5.16 NUMeric Group

The command in this group deal with numeric data output.
There are no front panel keys that correspond to the commands in this group. The commands in the DISPlay group are used to make the same settings and queries as the NUMERIC key on the front panel.

:NUMeric?

Function Queries all numeric data output settings.
Syntax `:NUMeric?`

:NUMeric:FORMat

Function Sets or queries the numeric data format.
Syntax
```
:NUMeric:FORMat {ASCii|FLOat}
:NUMeric:FORMat?
```
Example
```
:NUMERIC:FORMAT ASCII
:NUMERIC:FORMAT? ->
:NUMERIC:FORMAT ASCII
```
Description
- The format of the numeric data that is output varies depending on how this command is set. The different formats are explained below.
  (1) When the format is set to ASCii:
  Physical values are output in <NR3> format.(Only the elapsed integration time—TIME—is output in <NR1> format.)
  The data items are separated by commas.
  (2) When the format is set to FLOat:
  A header (for example, “#260” or “#3208”) is added in front of each numeric data block.
  A physical value in IEEE single-precision floating point (4-byte) format follows the header.
  The byte order of the data of each item is MSB First.
- For the formats of each individual numeric data item, see “Numeric Data Formats” at the end of this group of commands (page 5-78).

:NUMeric:HOLD

Function Sets or queries the on/off (hold/release) status of the numeric data hold feature.
Syntax
```
:NUMeric:HOLD {<Boolean>}
:NUMeric:HOLD?
```
Example
```
:NUMERIC:HOLD ON
:NUMERIC:HOLD? ->
:NUMERIC:HOLD 1
```
Description
- If :NUMeric:HOLD is set to ON before : NUMeric[:NORMal]:VALue? or :NUMeric:LIST:VALue? is executed, all the numeric data at that point in time can be held internally.
- As long as :NUMeric:HOLD is set to ON, numeric data is held even when the numeric data on the screen is updated.
- For example, if you wish to retrieve various types of numeric data from each element at the same point in time, use the following commands:

```
:NUMeric:HOLD ON
:NUMeric[:NORMal]:
ITEM1 URMS,1;ITEM2 IRMS,1;...
```
(Set the numeric data items of element 1.)
```
:NUMeric[:NORMal]:VALue?
```
(Receive the numeric data of element 1.)
```
:NUMeric[:NORMal]:
ITEM1 URMS,2;ITEM2 IRMS,2;...
```
(Set the numeric data items of element 2.)
```
:NUMeric[:NORMal]:VALue?
```
(Receive the numeric data of element 2.)
```
:NUMeric[:NORMal]:
ITEM1 URMS,3;ITEM2 IRMS,3;...
```
(Set the numeric data items of element 3.)
```
:NUMeric[:NORMal]:VALue?
```
(Receive the numeric data of element 3.)
```
:NUMeric:HOLD OFF
```

- If :NUMeric:HOLD is set to ON after having already been set to ON before, the numeric data is cleared, and the most recent numeric data is held internally. When retrieving numeric data continuously, this method can be used to circumvent the need to repeatedly set : NUMeric:HOLD to OFF.

:NUMeric:LIST?

Function Queries all harmonic measurement numeric list data output settings.

Syntax
```
:NUMeric:LIST?
```

Description
- This is only valid on models with the harmonic measurement (/G5 or /G6) option.
- The number of numeric list data items output by :NUMeric:LIST:ITEM<x> is determined by :NUMeric:LIST:NUMber.

:NUMeric:LIST:CLEar

Function Clears harmonic measurement numeric list data output items (sets the items to NONE).

Syntax
```
:NUMeric:LIST:CLEar {ALL|<NRf>[,<NRf>]}
ALL = Clear all items
First <NRf> = 1 to 64 (the number of the first item to clear)
Second <NRf> = 1 to 64 (the number of the last item to clear)
```

Example
```
:NUMERIC:LIST:CLEAR ALL
```

Description
- This is only valid on models with the harmonic measurement (/G5 or /G6) option.
- If the second <NRf> is omitted, the output item specified by the first <NRf> and all following output items (up to number 64) are cleared.

:NUMeric:LIST:DELete

Function Deletes harmonic measurement numeric list data output items.

Syntax
```
:NUMeric:LIST:DELete {<NRf>[,<NRf>]}
First <NRf> = 1 to 64 (the number of the first item to delete)
Second <NRf> = 1 to 64 (the number of the last item to delete)
```

Example
```
:NUMERIC:LIST:DELETE 1 (Deletes ITEM1 and shifts ITEM2 and subsequent items forward)
:NUMERIC:LIST:DELETE 1,3 (Deletes ITEM1 to ITEM3 and shifts ITEM4 and subsequent items forward)
```

Description
- This is only valid on models with the harmonic measurement (/G5 or /G6) option.
- The positions of deleted output items are filled by the items that follow them, and empty sections at the end are set to NONE.
- If the second <NRf> is omitted, only the output item specified by the first <NRf> is deleted.

:NUMeric:LIST:ITEM<x>

Function Sets or queries the output item (function and element) of the specified harmonic measurement numeric list data item.

Syntax
```
:NUMeric:LIST:ITEM<x>{NONE|<Function>,<Element>}
:NUMeric:LIST:ITEM<x>?
<x> = 1 to 64 (item number)
NONE = No output item
<Function> = {U|I|P|S|Q|LAMBda|PHI|PHIU|PHII|Z|RS|XS|RP|XP|UHDF|IHDF|PHDF}
<Element> = {<NRf>|SIGMA|SIGMB|SIGMC}(<NRf> = 1 to 6)
```

Example
```
:NUMERIC:LIST:ITEM1 U,1
:NUMERIC:LIST:ITEM1? ->
:NUMERIC:LIST:ITEM1 U,1
```

Description
- This is only valid on models with the harmonic measurement (/G5 or /G6) option.
- For information about the options available for <Function>, see Function Option List (2) on page 5-40.

:NUMeric:LIST:NUMber

Function Sets or queries the number of numeric list data items that are transmitted by :NUMeric:LIST:VALue?.

Syntax
```
:NUMeric:LIST:NUMber {<NRf>|ALL}
:NUMeric:LIST:NUMber?
<NRf> = 1 to 64 (ALL)
```

Example
```
:NUMERIC:LIST:NUMBER 5
:NUMERIC:LIST:NUMBER ->
:NUMERIC:LIST:NUMBER 5
```

Description
- This is only valid on models with the harmonic measurement (/G5 or /G6) option.
- If the parameter is omitted from the :NUMeric:LIST:VALue? command, the numeric list data items from 1 to the specified value are output in order.
- By default, the number of numeric data items is set to 1.

:NUMeric:LIST:ORDer

Function Sets or queries the maximum output harmonic order of the harmonic measurement numeric list data.

Syntax
```
:NUMeric:LIST:ORDer {<NRf>|ALL}
:NUMeric:LIST:ORDer?
<NRf> = 1 to 500 (ALL)
```

Example
```
:NUMERIC:LIST:ORDER 100
:NUMERIC:LIST:ORDER? ->
:NUMERIC:LIST:ORDER 100
```

Description This is only valid on models with the harmonic measurement (/G5 or /G6) option.

:NUMeric:LIST:PRESet

Function Presets the harmonic measurement numeric list data output item pattern.

Syntax
```
:NUMeric:LIST:PRESet {<NRf>}
<NRf> = 1 to 4
```

Example
```
:NUMERIC:LIST:PRESET 1
```

Description
- This is only valid on models with the harmonic measurement (/G5 or /G6) option.
- For information about the output items that are preset, see "(2) Preset Patterns for Harmonic Measurement Numeric List Data Output Items" on page 5-81 at the end of the commands for this group.
- By default, the output items of Pattern 2 are selected.

:NUMeric:LIST:SELect

Function Sets or queries the output components of the harmonic measurement numeric list data.

Syntax
```
:NUMeric:LIST:SELect {EVEN|ODD|ALL}
:NUMeric:LIST:SELect?
```

Example
```
:NUMERIC:LIST:SELECT ALL
:NUMERIC:LIST:SELECT? ->
:NUMERIC:LIST:SELECT ALL
```

Description
- This is only valid on models with the harmonic measurement (/G5 or /G6) option.
- The available options are explained below.
  EVEN = Outputs the components of TOTal, DC, and even-order harmonics
  ODD = Outputs the components of TOTal, DC, and odd-order harmonics
  ALL = Outputs all components

:NUMeric:LIST:VALue?

Function Queries the harmonic measurement numeric list data.

Syntax
```
:NUMeric:LIST:VALue? {<NRf>}
<NRf> = 1 to 64 (item number)
```

Example
- When <NRf> is specified:
```
:NUMERIC:LIST:VALUE? 1 -> 103.58E+00,
0.00E+00,103.53E+00,0.09E+00,
2.07E+00,0.04E+00,..(omitted)..,
0.01E+00,0.01E+00 (502 data items
max)
```
- When <NRf> is omitted:
```
(When :NUMeric:LIST:NUMber is set to
5)
:NUMERIC:LIST:VALUE? -> 103.58E+00,
0.00E+00,103.53E+00,0.09E+00,
2.07E+00,0.04E+00,..(omitted)..,
0.00E+00,0.00E+00
(502×5 = 2510 data items max)
```
- When :NUMeric:FORMat is set to FLOat:
```
:NUMERIC:LIST:VALUE? -> #N (N-digit
byte number)(data byte sequence)
```

Description
- This is only valid on models with the harmonic measurement (/G5 or /G6) option.
- A single numeric list data item consists of up to 502 items of numeric data in the following order: TOTal, DC, 1st order, ..., :NUMeric:LIST:ORDer.
- If <NRf> is specified, only the numeric list data of the specified item number is output (up to 502 items of data).
- If <NRf> is omitted, the numeric list data of item numbers from 1 to :NUMeric:LIST:NUMber is output in order (up to 502 times the number specified by :NUMeric:LIST:NUMber).
- For the formats of the individual numeric data items that are output, see "Numeric Data Formats" at the end of this group of commands (page 5-78).

:NUMeric:NORMal?

Function Queries all numeric data output settings.

Syntax
```
:NUMeric:NORMal?
```

Description The number of numeric data items output by :NUMeric[:NORMal]:ITEM<x> is determined by :NUMeric[:NORMal]NUMber.

:NUMeric[:NORMal]:CLEar

Function Clears numeric data output items (sets the items to NONE).

Syntax
```
:NUMeric[:NORMal]:CLEar {ALL|
<NRf>[,<NRf>]}
ALL = Clear all items
First <NRf> = 1 to 255 (the number
of the first item to clear)
Second <NRf> = 1 to 255 (the number
of the last item to clear)
```

Example
```
:NUMERIC:NORMAL:CLEAR ALL
```

Description If the 2nd <NRf> is omitted, the output item specified by the first <NRf> and all following output items (up to number 255) are cleared.

:NUMeric[:NORMal]:DELete

Function Deletes numeric data output items.

Syntax
```
:NUMeric[:NORMal]:DELete {<NRf>[,
<NRf>]}
First <NRf> = 1 to 255 (the number
of the first item to delete)
Second <NRf> = 1 to 255 (the number
of the last item to delete)
```

Example
```
:NUMERIC:NORMAL:DELETE 1 (Deletes
ITEM1 and shifts ITEM2 and subsequent
items forward)
:NUMERIC:NORMAL:DELETE 1,3 (Deletes
ITEM1 to ITEM3 and shifts ITEM4 and
subsequent items forward)
```

Description
- The positions of deleted output items are filled by the items that follow them, and empty sections at the end are set to NONE.
- If the second <NRf> is omitted, only the output item specified by the first <NRf> is deleted.

:NUMeric[:NORMal]:ITEM<x>

Function Sets or queries the specified numeric data output item (function, element, and harmonic order).

Syntax
```
:NUMeric[:NORMal]:ITEM<x>
{NONE|<Function>[,<Element>][,<Order>]}
:NUMeric[:NORMal]:ITEM<x>?
<x> = 1 to 255 (item number)
NONE = No output item
<Function> = {URMS|IRMS|P|S|Q|...}
<Element> = {<NRf>|SIGMA|SIGMB|
SIGMC}(<NRf> = 1 to 6)
<Order> = {TOTal|DC|<NRf>}
(<NRf> = 1 to 500)
```

Example
```
:NUMERIC:NORMAL:ITEM1 URMS,1
:NUMERIC:NORMAL:ITEM1? ->
:NUMERIC:NORMAL:ITEM1 URMS,1
:NUMERIC:NORMAL:ITEM1 UK,1,1
:NUMERIC:NORMAL:ITEM1? ->
:NUMERIC:NORMAL:ITEM1 UK,1,1
```

Description
- For information about the options available for <Function>, see Function Option List (1), in the DISPlay Group section on page 5-37.
- If <Element> is omitted, the element is set to 1.
- If <Order> is omitted, the order is set to TOTal.
- <Element> and <Order> are omitted from responses to functions that do not need them.

:NUMeric[:NORMal]:NUMber

Function Sets or queries the number of numeric data items that are transmitted by the :NUMeric[:NORMal]:VALue? command.

Syntax
```
:NUMeric[:NORMal]:NUMber {<NRf>|ALL}
:NUMeric[:NORMal]:NUMber?
<NRf> = 1 to 255 (ALL)
```

Example
```
:NUMERIC:NORMAL:NUMBER 15
:NUMERIC:NORMAL:NUMBER ->
:NUMERIC:NORMAL:NUMBER 15
```

Description
- If the parameter is omitted from the :NUMeric[:NORMal]:VALue? command, the numeric data items from 1 to the specified value are output in order.
- By default, the number of numeric data items is set to 15.

:NUMeric[:NORMal]:PRESet

Function Presets the numeric data output item pattern.

Syntax
```
:NUMeric[:NORMal]:PRESet {<NRf>}
<NRf> = 1 to 4
```

Example
```
:NUMERIC:NORMAL:PRESET 1
```

Description
- For information about the output items that are preset, see “(1) Preset Patterns for Numeric Data Items” on page 5-79 at the end of the commands for this group.
- By default, the output items of Pattern 2 are selected.

:NUMeric[:NORMal]:VALue?

Function Queries the numeric data.

Syntax
```
:NUMeric[:NORMal]:VALue? {<NRf>}
<NRf> = 1 to 255 (item number)
```

Example
- When <NRf> is specified:
```
:NUMERIC:NORMAL:VALUE? 1 ->
103.79E+00
```
- When <NRf> is omitted:
```
:NUMERIC:NORMAL:VALUE? -> 103.79E+
00,1.0143E+00,105.27E+00,..
(omitted)..,1.428E+00
```
- When :NUMeric:FORMat is set to FLOat:
```
:NUMERIC:NORMAL:VALUE? -> #N
(N-digit byte number)(data byte
sequence)
```

Description
- If <NRf> is specified, only the numeric data for the specified item is output.
- If <NRf> is omitted, the numeric data items from 1 to the number specified by the :NUMeric[:NORMal]:NUMber command are output in order.
- For the formats of the individual numeric data items that are output, see “Numeric Data Formats” at the end of this group of commands (page 5-78).

*** Numeric Data Formats**

(1) Normal Data

- The Σ of electric power values P, S, and Q
- Integrated values WH, WHP, WHM, AH, AHP, AHM, WS, and WQ
- Efficiency values ETA1, ETA2, ETA3, and ETA4; harmonic distortion factor values UHDFk, IHDFk, and PHDFk; and distortion factor values UTHD, ITHD, and PTHD.
  ASCII: <NR3> format (mantissa: up to 6 digits, exponent: 2 digits. Example: [-]123.456E+00)
  FLOAT: IEEE single-precision floating point (4-byte) format
- Elapsed integration time (TIME)
  ASCII: <NR1> format in units of seconds. Example: 3600 for 1 hour (1:00:00).
  FLOAT: IEEE single-precision floating point (4-byte) format in units of seconds. Example: 0x45610000 for 1 hour (1:00:00).
- No items (NONE)
  ASCII: NAN (Not A Number)
  FLOAT: 0x7E951BEE (9.91E+37)
- Other
  ASCII: <NR3> format (mantissa: up to 5 digits, exponent: 2 digits. Example: [-]123.45.456E+00)
  FLOAT: IEEE single-precision floating point (4-byte) format

(2) Error Data

- Data does not exist (the display shows "---------")
  ASCII: NAN (Not A Number)
  FLOAT: 0x7E951BEE (9.91E+37)
- Over-range (the display shows "---O L---")
- Overflow (the display shows "---O F---")
- Data over (the display shows " Error ")
  ASCII: INF (INFinity)
  FLOAT: 0x7E94F56A (9.9E+37)

Note

- In 180° (Lead/Lag) display, the phase differences Φ (PHI) of elements 1 to 6 are output in the range between -180.00 to 180.00 with lead (D) and lag (G) set to negative and positive values, respectively.
- There may be up to six digits in the mantissa of the Σ of power values P, S, and Q depending on the combination of the voltage range and current range (e.g. the power range).For the table of power ranges, see the getting started guide, IM WT1801-03EN.
- The following values always have three decimal places: efficiency values ETA1, ETA2, ETA3, and ETA4; harmonic distortion factor values UHDFk, IHDFk, and PHDFk; and distortion factor values UTHD, ITHD, and PTHD.If the values exceed 100 %, the mantissa will have six digits.

*** Preset Patterns for Numeric Data Items**

The Function Option List in the DISPlay Group section contains a list of the function names used in commands (where the command syntax contains <Function>) and the function names in the WT1800 display menus that correspond to them.

Note

This list indicates the measurement function and element that are assigned to each item number (ITEM<x>). Items that are not set to be measured are displayed or output in the same fashion as when the data does not exist.For example, if frequency FI of the current of element 2 is not set to be measured, the output of ITEM19 in pattern 1 is the same as the output when the data does not exist (NAN if the data format is ASCII).

(1) Preset Patterns for Numeric Data Items

These patterns apply to the :NUMeric[:NORMal]:PRESet command.

Pattern 1

ITEM<x>	<Function>	<Element>
1	URMS	1
2	IRMS	1
3	P	1
4	S	1
5	Q	1
6	LAMBda	1
7	PHI	1
8	FU	1
9	FI	1
10	NONE	
11 to 19	URMS to FI	2
20	NONE	
21 to 29	URMS to FI	3
30	NONE	
31 to 39	URMS to FI	4
40	NONE	
41 to 49	URMS to FI	5
50	NONE	
51 to 59	URMS to FI	6
60	NONE	
61 to 69	URMS to FI	SIGMA
70	NONE	
71 to 79	URMS to FI	SIGMB
80	NONE	
81 to 89	URMS to FI	SIGMC
90	NONE	
91 to 255	NONE	

Pattern 2

ITEM<x>	<Function>	<Element>
1	URMS	1
2	UMN	1
3	UDC	1
4	UAC	1
5	IRMS	1
6	IMN	1
7	IDC	1
8	IAC	1
9	P	1
10	S	1
11	Q	1
12	LAMBda	1
13	PHI	1
14	FU	1
15	FI	1

16 to 30	URMS to FI	2
31 to 45	URMS to FI	3
46 to 60	URMS to FI	4
61 to 75	URMS to FI	5
76 to 90	URMS to FI	6
91 to 105	URMS to FI	SIGMA
106 to 120	URMS to FI	SIGMB
121 to 135	URMS to FI	SIGMC
136 to 255	NONE	

Pattern 3

ITEM<x>	**<Function>**	**<Element>**
1	URMS	1
2	UMN	1
3	UDC	1
4	UAC	1
5	IRMS	1
6	IMN	1
7	IDC	1
8	IAC	1
9	P	1
10	S	1
11	Q	1
12	LAMBda	1
13	PHI	1
14	FU	1
15	FI	1
16	UPPeak	1
17	UMPeak	1
18	IPPeak	1
19	IMPeak	1
20	NONE	
21 to 39	URMS to IMPeak	2
40	NONE	
41 to 59	URMS to IMPeak	3
60	NONE	
61 to 79	URMS to IMPeak	4
80	NONE	
81 to 99	URMS to IMPeak	5
100	NONE	
101 to 119	URMS to IMPeak	6
120	NONE	
121 to 139	URMS to IMPeak	SIGMA
140	NONE	
141 to 159	URMS to IMPeak	SIGMB
160	NONE	
161 to 179	URMS to IMPeak	SIGMC
180	NONE	
181 to 255	NONE	

Pattern 4

ITEM<x>	**<Function>**	**<Element>**
1	URMS	1
2	UMN	1
3	UDC	1
4	UAC	1
5	IRMS	1
6	IMN	1
7	IDC	1
8	IAC	1
9	P	1
10	S	1

11	Q	1
12	FU	1
13	FI	1
14	TIME	1
15	WH	1
16	WHP	1
17	WHM	1
18	AH	1
19	AHP	1
20	AHM	1
21 to 40	URMS to AHM	2
41 to 60	URMS to AHM	3
61 to 80	URMS to AHM	4
81 to 100	URMS to AHM	5
101 to 120	URMS to AHM	6
121 to 140	URMS to AHM	SIGMA
141 to 160	URMS to AHM	SIGMB
161 to 180	URMS to AHM	SIGMC
181 to 255	NONE	

(2) Preset Patterns for Harmonic Measurement Numeric List Data Output Items

These patterns apply to the :NUMeric:LIST:PRESet command.

Pattern 1

ITEM<x>	**<Function>**	**<Element>**
1	U	1
2	I	1
3	P	1
4 to 6	U to P	2
7 to 9	U to P	3
10 to 12	U to P	4
13 to 15	U to P	5
16 to 18	U to P	6
19 to 64	NONE	

Pattern 2

ITEM<x>	**<Function>**	**<Element>**
1	U	1
2	I	1
3	P	1
4	PHIU	1
5	PHII	1
6 to 10	U to PHII	2
11 to 15	U to PHII	3
16 to 20	U to PHII	4
21 to 25	U to PHII	5
26 to 30	U to PHII	6
31 to 64	NONE	

Pattern 3

ITEM<x>	<Function>	<Element>
1	U	1
2	I	1
3	P	1
4	S	1
5	Q	1
6	LAMBda	1
7	PHI	1
8	PHIU	1
9	PHII	1
10 to 18	U to PHII	2
19 to 27	U to PHII	3
28 to 36	U to PHII	4
37 to 45	U to PHII	5
46 to 54	U to PHII	6
55 to 64	NONE	

Pattern 4

ITEM<x>	<Function>	<Element>
1	U	1
2	I	1
3	P	1
4	Q	1
5	Z	1
6	RS	1
7	XS	1
8	RP	1
9	XP	1
10 to 18	U to XP	2
19 to 27	U to XP	3
28 to 36	U to XP	4
37 to 45	U to XP	5
46 to 54	U to XP	6
55 to 64	NONE	

5.17 RATE Group

The command in this group deals with the data update rate.
You can make the same settings and queries that you can make by pressing UPDATE RATE on the front panel.

:RATE

Function Sets or queries the data update rate.

Syntax
```
:RATE {<Time>}
:RATE?
<Time> = 50 ms, 100 ms, 200 ms,
500 ms, 1 s, 2 s, 5 s, 10 s, 20 s
```

Example
```
:RATE 500MS
:RATE? ->
:RATE 500.0E-03
```

5.18 STATus Group

The commands in this group are used to make settings and queries related to the status report.There are no front panel keys that correspond to the commands in this group.For information about status reports, see chapter 6.

:STATus?

Function Queries all the settings for the communication status feature.
Syntax `:STATus?`

:STATus:CONDition?

Function Queries the contents of the condition register.
Syntax `:STATus:CONDition?`
Example `:STATUS:CONDITION? -> 16`
Description For information about the condition register, see chapter 6, “Status Reports.”

:STATus:EESE

Function Sets or queries the extended event enable register.
Syntax `:STATus:EESE <Register>`
`:STATus:EESE?`
`<Register> = 0 to 65535`
Example `:STATUS:EESE #B0000000000000000`
`:STATus:EESE? ->`
`:STATUS:EESE 0`
Description For information about the extended event enable register, see chapter 6, “Status Reports.”

:STATus:EESR?

Function Queries the contents of the extended event register and clears the register.
Syntax `:STATus:EESR?`
Example `:STATUS:EESR? -> 0`
Description For information about the extended event register, see chapter 6, “Status Reports.”

:STATus:ERRor?

Function Queries the error code and message of the last error that has occurred (top of the error queue).
Syntax `:STATus:ERRor?`
Example `:STATUS:ERROR? ->`
`113,"Underfined Header"`
Description
- If no error has occurred, 0, “Noerror” is returned.
- You can use the :STATus:QMESsage command to specify whether the message is included.

:STATus:FILTer<x>

Function Sets or queries the transition filter.
Syntax `:STATus:FILTer<x> {RISE|FALL|BOTH|NEVer}`
`:STATus:FILTer<x>?`
<x> = 1 to 16
Example `:STATUS:FILTER2 RISE`
`:STATus:FILTER2? ->`
`:STATUS:FILTER2 RISE`
Description
- Set how each bit in the condition register must change to trigger the setting of an event.If a bit is set to RISE, an event is set when the bit changes from 0 to 1.
- For information about the transition filter, see chapter 6, “Status Reports.”

:STATus:QENable

Function Sets or queries whether messages other than errors will be stored to the error queue (ON/OFF).
Syntax `:STATus:QENable {<Boolean>}`
`:STATus:QENable?`
Example `:STATUS:QENABLE ON`
`:STATus:QENABLE? ->`
`:STATus:QENABLE 1`

:STATus:QMESsage

Function Sets or queries whether message information will be attached to the response to the STATus: ERRor? query (ON/OFF).
Syntax `:STATus:QMESsage {<Boolean>}`
`:STATus:QMESsage?`
Example `:STATUS:QMESSAGE ON`
`:STATus:QMESSAGE? ->`
`:STATus:QMESSAGE 1`

:STATus:SPOLl?

Function Executes serial polling.
Syntax `:STATus:SPOLl?`
Example `:STATUS:SPOLL? -> :STATUS:SPOLL 0`

5.19 STORe Group

The commands in this group deal with storage.
You can make the same settings and queries that you can make by pressing STORE START, STORE STOP, STORE RESET (SHIFT+STORE STOP), and STORE SET (SHIFT+STORE START) on the front panel.

:STORe?
Function Queries all numeric data storage settings.
Syntax :STORe?

:STORe:COUNt
Function Sets or queries the storage count.
Syntax :STORe:COUNt {<NRf>|INFinite}
:STORe:COUNt?
<NRf> = 1 to 9999999
INFinite = No limit
Example :STORE:COUNT 100
:STORE:COUNT? ->
:STORE:COUNT 100

:STORe:FILE?
Function Queries all settings related to the saving of the data stored in the WT1800 to files.
Syntax :STORe:FILE?

:STORe:FILE:ANAMing
Function Sets or queries the auto naming feature for saving stored numeric data to files.
Syntax :STORe:FILE:ANAMing {OFF|NUMBering|DATE}
:STORe:FILE:ANAMing?
Example :STORE:FILE:ANAMING NUMBERING
:STORE:FILE:ANAMING? ->
:STORE:FILE:ANAMING NUMBERING

:STORe:FILE:CDIRectory
Function Changes the directory that stored numeric data is saved to.
Syntax :STORe:FILE:CDIRectory {<String>}
<String> = Directory name
Example :STORE:FILE:CDIRECTORY "STORE"
Description Specify ".." to move up to the parent directory.

:STORe:FILE:CONVert?
Function Queries all settings related to the conversion of stored numeric data files into CSV format.
Syntax :STORe:FILE:CONVert?

:STORe:FILE:CONVert:ABORt
Function Aborts the conversion of a numeric data file to CSV format.
Syntax :STORe:FILE:CONVert:ABORt
Example :STORE:FILE:CONVERT:ABORT

:STORe:FILE:CONVert:AUTO
Function Sets or queries the on/off status of the automatic conversion of stored numeric data files to CSV format.
Syntax :STORe:FILE:CONVert:AUTO {<Boolean>}
:STORe:FILE:CONVert:AUTO?
Example :STORE:FILE:CONVERT:AUTO ON
:STORE:FILE:CONVERT:AUTO? ->
:STORE:FILE:CONVERT:AUTO 1

:STORe:FILE:CONVert:EXECute
Function Converts the specified stored numeric data file to CSV format.
Syntax :STORe:FILE:CONVert:
EXECute {<String>}
<String> = File name
Example :STORE:FILE:CONVERT:EXECUTE "STORE1"
Description • Specify the file name without an extension.
• This command is an overlap command.

:STORe:FILE:DRIVe
Function Sets the drive that stored numeric data is saved to.
Syntax :STORe:FILE:DRIVe {RAM|USB[,<NRf>]|NETWork}
RAM = Built-in RAM drive
USB = USB memory device drive; <NRf> = 0 or 1 (drive number)
NETWork = Network drive
Example :STORE:FILE:DRIVE RAM

:STORe:FILE:FREE?
Function Queries the free space (in bytes) on the drive that the stored numeric data is saved to.
Syntax :STORe:FILE:FREE?
Example :STORE:FILE:FREE? -> 20912128

:STORe:FILE:NAME

Function Sets or queries the name of the file that stored numeric data is saved to.

Syntax
```
:STORe:FILE:NAME {<String>}
:STORe:FILE:NAME?
<String> = File name
```

Example
```
:STORE:FILE:NAME "STORE1"
:STORE:FILE:NAME? ->
:STORE:FILE:NAME "STORE1"
```

:STORe:FILE:PATH?

Function Queries the absolute path of the directory that the stored numeric data is saved to.

Syntax
```
:STORe:FILE:PATH?
```

Example
```
:STORE:FILE:PATH? -> "USB-0/STORE"
```

:STORe:INTerval

Function Sets or queries the storage interval.

Syntax
```
:STORe:INTerval {<NRf>,<NRf>,<NRf>}
:STORe:INTerval?
First <NRf> = 0 to 99 (hours)
Second <NRf> = 0 to 59 (minutes)
Third <NRf> = 1 to 59 (seconds)
```

Example
```
:STORE:INTERVAL 0,0,0
:STORE:INTERVAL? ->
:STORE:INTERVAL 0,0,0
```

Description This command is valid when the storage mode (:STORe:SMODe) is set to MANual, RTIMe, or INTEGrate.

:STORe:NUMeric?

Function Queries all numeric data storage item settings.

Syntax
```
:STORe:NUMeric?
```

:STORe:NUMeric:ITEM

Function Sets or queries the numeric data storage item selection method.

Syntax
```
:STORe:NUMeric:ITEM {DISPlayed|
SELected}
:STORe:NUMeric:ITEM?
DISPlayed = Automatic selection
method in which all the items that
are displayed on the screen are
selected
SELected = Manual selection method
```

Example
```
:STORE:NUMERIC:ITEM SELECTED
:STORE:NUMERIC:ITEM? ->
:STORE:NUMERIC:ITEM SELECTED
```

Description The available options are explained below.
DISPlayed = The numeric items that are displayed on the screen are saved to the file.
SELected = The numeric items that are specified with the commands that start with ":STORe:NUMeric:NORMal: . . ." are saved to the file.

:STORe:NUMeric:NORMal?

Function Queries all numeric data storage item settings (for the manual selection method).

Syntax
```
:STORe:NUMeric:NORMal?
```

Description This command is valid when the storage item selection method (:STORe:NUMeric:ITEM) is set to SELected (the manual selection method).

:STORe:NUMeric[:NORMal]:ALL

Function Collectively sets the on/off status of the output of all element functions when numeric data is stored.

Syntax
```
:STORe:NUMeric[:NORMal]:ALL
{<Boolean>}
```

Example
```
:STORE:NUMERIC:NORMAL:ALL ON
```

:STORe:NUMeric[:NORMal]:{ELEMent<x>|SIGMA|SIGMB|SIGMC}

Function Sets or queries the on/off status of the output of the specified element or wiring unit ΣA, ΣB, or ΣC when numeric data is stored.

Syntax
```
:STORe:NUMeric[:NORMal]:{ELEMent<x>|
SIGMA|SIGMB|SIGMC} {<Boolean>}
:STORe:NUMeric[:NORMal]:{ELEMent<x>|
SIGMA|SIGMB|SIGMC}?
<x> = 1 to 6
```

Example
```
:STORE:NUMERIC:NORMAL:ELEMENT1 ON
:STORE:NUMERIC:NORMAL:ELEMENT1? ->
:STORE:NUMERIC:NORMAL:ELEMENT1 1
```

Description SIGMA, SIGMB, or SIGMC is invalid if the wiring system setting ([:INPut]:WIRing) is made in such a way that the corresponding wiring unit (ΣA, ΣB, or ΣC) does not exist.

:STORe:NUMeric[:NORMal]:<Function>

Function Sets or queries the on/off status of the specified function's output when numeric data is stored.

Syntax
```
:STORe:NUMeric[:NORMal]:
<Function> {<Boolean>}
:STORe:NUMeric[:NORMal]:<Function>?
<Function> = {URMS|IRMS|P|S|Q|...}
```

Example
```
:STORE:NUMERIC:NORMAL:URMS ON
:STORE:NUMERIC:NORMAL:URMS? ->
:STORE:NUMERIC:NORMAL:URMS 1
```

Description For information about the options available for <Function>, see Function Option List (1), in the DISPlay Group section on page 5-37.

:STORe:NUMeric[:NORMal]:PRESet<x>
Function Presets the output on/off pattern of the element functions to be used when numeric data is stored.
Syntax :STORe:NUMeric[:NORMal]:PRESet<x>
<x> = 1 or 2 (preset number)
Example :STORE:NUMERIC:NORMAL:PRESET1
Description For details on the storage item setting patterns that result when the pattern is reset, see the features guide, IM WT1801-01EN.

:STORe:RESet
Function Resets the numeric data storage feature.
Syntax :STORe:RESet
Example :STORE:RESET

:STORe:RTIMe?
Function Queries the storage start and end times for real-time storage mode.
Syntax :STORe:RTIMe?

:STORe:RTIMe:{STARt|END}
Function Sets or queries the storage start or end time for real-time storage mode.
Syntax :STORe:RTIMe:{STARt|END} {<NRf>,<NRf>,<NRf>,<NRf>,<NRf>,<NRf>}
:STORe:RTIMe:{STARt|END}?
{<NRf>,<NRf>,<NRf>,<NRf>,<NRf>,<NRf>,<NRf>} = 2001,1,1,0,0,0 to 2099,12,31,23,59,59
First <NRf> = 2001 to 2099 (year)
Second <NRf> = 1 to 12 (month)
Third <NRf> = 1 to 31 (day)
Fourth <NRf> = 0 to 23 (hour)
Fifth <NRf> = 0 to 59 (minute)
Sixth <NRf> = 0 to 59 (second)
Example :STORE:RTIME:START 2011,1,1,0,0,0
:STORE:RTIME:START? ->
:STORE:RTIME:START 2011,1,1,0,0,0
Description This command is valid when the storage mode (:STORe:SMODe) is set to RTIMe.

:STORe:SASTart
Function Sets or queries whether numeric data is stored when storage starts.
Syntax :STORe:SASTart {<Boolean>}
:STORe:SASTart?
Example :STORE:SASTART OFF
:STORE:SASTART? ->
:STORE:SASTART 0
Description This command is valid when the storage mode (:STORe:SMODe) is set to MANual, RTIMe, or INTEGrate (and when the storage interval is a value other than 0 for MANual or RTIMe mode).

:STORe:SMODe
Function Sets or queries the storage mode.
Syntax :STORe:SMODe {MANual|RTIMe|INTEGrate|EVENt|SINGle}
:STORe:SMODe?
MANual = Manual storage mode
RTIMe = Real-time storage mode
INTEGrate = Integration-synchronized storage mode
EVENt = Event-synchronized storage mode
SINGle = Single-shot storage mode
Example :STORE:SMODE MANUAL
:STORE:SMODE? ->
:STORE:SMODE MANUAL

:STORe:STARt
Function Begins the storing of numeric data.
Syntax :STORe:STARt
Example :STORE:START
Description If :STORe:SMODe is set to MANual, the storage operation is executed.If :STORe:SMODe is set to RTIMe, INTEGrate, or EVENt, the WT1800 enters into a storage wait state.If :STORe:SMODe is set to SINGle, the storage operation is executed.

:STORe:STATe?
Function Sets or queries the storage state.
Syntax :STORe:STATe?
Example :STORE:STATE? -> RESET
Description • The response is as follows:
RESet = Storage reset
READy = Storage standby
STARt = Currently storing
STOP = Storage stopped
COMPlete = Storage complete (or ended due to an error)
CONVert = Converting stored data to CSV format
CLOSe = Final processing of a WTS or HDS file

:STORe:STOP
Function Stops the storing of numeric data.
Syntax :STORe:STOP
Example :STORE:STOP

:STORe:TEVent
Function Sets or queries the event that the event-synchronized storage mode will trigger on.
Syntax :STORe:TEVent {<NRf>}
:STORe:TEVent?
<NRf> = 1 to 8 (event number)
Example :STORE:TEVENT 1
:STORE:TEVENT? ->
:STORE:TEVENT 1
Description This command is valid when the storage mode (:STORe:SMODe) is set to EVENt.

5.20 SYSTem Group

The commands in this group deal with the system.You can make the same settings and queries that you can make by pressing UTILITY on the front panel and then using the System Config menu.

:SYSTem?

Function Queries all system settings.
Syntax `:SYSTem?`

:SYSTem:CLOCk?

Function Queries all date/time settings.
Syntax `:SYSTem:CLOCk?`

:SYSTem:CLOCk:DISPlay

Function Sets or queries the on/off status of the date/time display.
Syntax
```
:SYSTem:CLOCk:DISPlay {<Boolean>}
:SYSTem:CLOCk:DISPlay?
```
Example
```
:SYSTEM:CLOCK:DISPLAY ON
:SYSTEM:CLOCK:DISPLAY? ->
:SYSTEM:CLOCK:DISPLAY 1
```

:SYSTem:CLOCk:SNTP?

Function Queries all settings related to using SNTP to set the date and time.
Syntax `:SYSTem:CLOCk:SNTP?`

:SYSTem:CLOCk:SNTP[:EXECute]

Function Uses SNTP to set the date and time.
Syntax `:SYSTem:CLOCk:SNTP[:EXECute]`
Example `:SYSTEM:CLOCK:SNTP:EXECUTE`

:SYSTem:CLOCk:SNTP:GMTTime

Function Sets or queries the time difference from Greenwich Mean Time.
Syntax
```
:SYSTem:CLOCk:SNTP:GMTTime
{<String>}
:SYSTem:CLOCk:SNTP:GMTTime?
<String> = "HH:MM" (HH = hours, MM =
minutes)
```
Example
```
:SYSTEM:CLOCK:SNTP:GMTTIME "09:00"
:SYSTEM:CLOCK:SNTP:GMTTIME? ->
:SYSTEM:CLOCK:SNTP:GMTTIME "09:00"
```

:SYSTem:CLOCk:TYPE

Function Sets or queries the date/time setup method.
Syntax
```
:SYSTem:CLOCk:TYPE {MANual|SNTP}
:SYSTem:CLOCk:TYPE?
```
Example
```
:SYSTEM:CLOCK:TYPE MANUAL
:SYSTEM:CLOCK:TYPE? ->
:SYSTEM:CLOCK:TYPE MANUAL
```

:SYSTem:DATE

Function Sets or queries the date.
Syntax
```
:SYSTem:DATE {<String>}
:SYSTem:DATE?
<String> = "YY/MM/DD" (YY = year, MM
= month, DD = day)
```
Example
```
:SYSTEM:DATE "11/01/01"
:SYSTEM:DATE? -> "11/01/01"
```
Description For year, enter the last two digits of the year according to the Gregorian calendar.

:SYSTem:DFLow:FREQuency

Function Sets or queries the frequency data display format when a low frequency (or no frequency) input is applied.
Syntax
```
:SYSTem:DFLow:FREQuency {0|ERRor}
:SYSTem:DFLow:FREQuency?
```
Example
```
:SYSTEM:DFLOW:FREQUENCY ERROR
:SYSTEM:DFLOW:FREQUENCY? ->
:SYSTEM:DFLOW:FREQUENCY ERROR
```

:SYSTem:DFLow:MOTor

Function Sets or queries the motor data display format when no pulse is applied.
Syntax
```
:SYSTem:DFLow:MOTor {0|ERRor}
:SYSTem:DFLow:MOTor?
```
Example
```
:SYSTEM:DFLOW:MOTOR ERROR
:SYSTEM:DFLOW:MOTOR? ->
:SYSTEM:DFLOW:MOTOR ERROR
```
Description This is only valid on models with the motor evaluation function (/MTR) option.

:SYSTem:DPOint

Function Sets or queries the type of decimal point that is used when saving various data in ASCII format (CSV).
Syntax
```
:SYSTem:DPOint {PERiod|COMMa}
:SYSTem:DPOint?
```
Example
```
:SYSTEM:DPOINT PERIOD
:SYSTEM:DPOINT? ->
:SYSTEM:DPOINT PERIOD
```

:SYSTem:ECLear

Function Clears error messages displayed on the screen.
Syntax `:SYSTem:ECLear`
Example `:SYSTEM:ECLEAR`

:SYSTem:FONT
Function Sets or queries the menu and message font size.
Syntax :SYSTem:FONT {SMALl|LARGe}
:SYSTem:FONT?
Example :SYSTEM:FONT LARGE
:SYSTEM:FONT? ->
:SYSTEM:FONT LARGE

:SYSTem:KLOCk
Function Sets or queries the on/off status of the key lock.
Syntax :SYSTem:KLOCk {<Boolean>}
:SYSTem:KLOCk?
Example :SYSTEM:KLOCK OFF
:SYSTEM:KLOCK? ->
:SYSTEM:KLOCK 0

:SYSTem:LANGuage?
Function Queries all display language settings.
Syntax :SYSTem:LANGuage?

:SYSTem:LANGuage:MENU
Function Sets or queries the menu language.
Syntax :SYSTem:LANGuage:MENU {JAPANese|ENGLish}
:SYSTem:LANGuage:MENU?
Example :SYSTEM:LANGUAGE:MENU ENGLISH
:SYSTEM:LANGUAGE:MENU? ->
:SYSTEM:LANGUAGE:MENU ENGLISH

:SYSTem:LANGuage:MESSage
Function Sets or queries the message language.
Syntax :SYSTem:LANGuage:MESSage {JAPANese|ENGLish}
:SYSTem:LANGuage:MESSage?
Example :SYSTEM:LANGUAGE:MESSAGE ENGLISH
:SYSTEM:LANGUAGE:MESSAGE? ->
:SYSTEM:LANGUAGE:MESSAGE ENGLISH

:SYSTem:LCD?
Function Queries all LCD settings.
Syntax :SYSTem:LCD?

:SYSTem:LCD:AOFF?
Function Queries all the settings for the feature that automatically turns off the backlight.
Syntax :SYSTem:LCD:AOFF?

:SYSTem:LCD:AOFF[:STATe]
Function Sets or queries the on/off status of the feature that automatically turns off the backlight.
Syntax :SYSTem:LCD:AOFF[:STATe] {<Boolean>}
:SYSTem:LCD:AOFF:STATe?
Example :SYSTEM:LCD:AOFF:STATE ON
:SYSTEM:LCD:AOFF:STATE? ->
:SYSTEM:LCD:AOFF:STATE 1

:SYSTem:LCD:AOFF:TIME
Function Sets or queries the amount of time until the backlight is automatically turned off.
Syntax :SYSTem:LCD:AOFF:TIME {<NRf>}
:SYSTem:LCD:AOFF:TIME?
<NRf> = 1 to 60 (minutes)
Example :SYSTEM:LCD:AOFF:TIME 5
:SYSTEM:LCD:AOFF:TIME? ->
:SYSTEM:LCD:AOFF:TIME 5

:SYSTem:LCD:BRIGhtness
Function Sets or queries the LCD brightness.
Syntax :SYSTem:LCD:BRIGhtness {<NRf>}
:SYSTem:LCD:BRIGhtness?
<NRf> = 1 to 10
Example :SYSTEM:LCD:BRIGHTNESS 7
:SYSTEM:LCD:BRIGHTNESS? ->
:SYSTEM:LCD:BRIGHTNESS 7

:SYSTem:LCD:COLor?
Function Queries all LCD color settings.
Syntax :SYSTem:LCD:COLor?

:SYSTem:LCD:COLor:BASecolor
Function Sets or queries the screen (menu) base color.
Syntax :SYSTem:LCD:COLor:BASecolor {BLUE|GRAY}
:SYSTem:LCD:COLor:BASecolor?
Example :SYSTEM:LCD:COLOR:BASECOLOR BLUE
:SYSTEM:LCD:COLOR:BASECOLOR? ->
:SYSTEM:LCD:COLOR:BASECOLOR BLUE

:SYSTem:LCD:COLor:GRAPh?
Function Queries all waveform color settings.
Syntax :SYSTem:LCD:COLor:GRAPh?

:SYSTem:LCD:COLor:GRAPh:CHANnel<x>

Function Sets or queries the specified waveform's color.

Syntax
```
:SYSTem:LCD:COLor:GRAPh:CHANnel<x>
{YELLow|GREen|MAGenta|CYAN|RED|
ORANge|LBLue|PURPle|BLUE|PINK|LGReen|
DBLue|BGReen|SPINk|MGReen|GRAY}
:SYSTem:LCD:COLor:GRAPh:CHANnel<x>?
<x> = 1 to 16 (waveform channel)
YELLow = Yellow
GREen = Green
MAGenta = Magenta
CYAN = Cyan
RED = Red
ORANge = Orange
LBLue = Light blue
PURPle = Purple
BLUE = Blue
PINK = Pink
LGReen = Light green
DBLue = Dark blue
BGReen = Blue green
SPINk = Salmon pink
MGReen = Mild green
GRAY = Gray
```

Example
```
:SYSTEM:LCD:COLOR:GRAPH:
CHANNEL1 YELLOW
:SYSTEM:LCD:COLOR:GRAPH:
CHANNEL1? ->
:SYSTEM:LCD:COLOR:GRAPH:
CHANNEL1 YELLOW
```

:SYSTem:LCD:COLor:GRAPh:PRESet

Function Presets the waveform color pattern.

Syntax
```
:SYSTem:LCD:COLor:GRAPh:
PRESet {DEFault|CLASsic}
```

Example
```
:SYSTEM:LCD:COLOR:GRAPH:
PRESET DEFAULT
```

:SYSTem:LCD:COLor:INTENsity:GRID

Function Sets or queries the grid intensity.

Syntax
```
:SYSTem:LCD:COLor:INTENsity:
GRID {<NRf>}
:SYSTem:LCD:COLor:INTENsity:GRID?
<NRf> = 1 to 8 (grid intensity)
```

Example
```
:SYSTEM:LCD:COLOR:INTENSITY:GRID 4
:SYSTEM:LCD:COLOR:INTENSITY:GRID? ->
:SYSTEM:LCD:COLOR:INTENSITY:GRID 4
```

:SYSTem:LCD[:STATe]

Function Sets or queries the on/off status of the backlight.

Syntax
```
:SYSTem:LCD[:STATe] {<Boolean>}
:SYSTem:LCD:STATe?
```

Example
```
:SYSTEM:LCD:STATE ON
:SYSTEM:LCD:STATE? ->
:SYSTEM:LCD:STATE 1
```

:SYSTem:MODel?

Function Queries the model code.

Syntax
```
:SYSTem:MODel?
```

Example
```
:SYSTEM:MODEL? ->
:SYSTEM:MODEL "WT1806"
```

Description Returns the text that appears next to Model on the System Overview screen, which can be accessed by pressing UTILITY.

:SYSTem:RESolution

Function Sets or queries the numeric data display resolution.

Syntax
```
:SYSTem:RESolution {<NRf>}
:SYSTem:RESolution?
<NRf> = 4, 5 (digits)
```

Example
```
:SYSTEM:RESOLUTION 5
:SYSTEM:RESOLUTION? ->
:SYSTEM:RESOLUTION 5
```

:SYSTem:SERial?

Function Queries the serial number.

Syntax
```
:SYSTem:SERial?
```

Example
```
:SYSTEM:SERIAL? ->
:SYSTEM:SERIAL "123456789"
```

Description Returns the text that appears next to No. on the System Overview screen, which can be accessed by pressing UTILITY.

:SYSTem:SUFFix?

Function Queries the suffix code.

Syntax
```
:SYSTem:SUFFix?
```

Example
```
:SYSTEM:SUFFIX? ->
:SYSTEM:SUFFIX "-33-M-HE/EX6/B5/G6/
DT/FQ/V1/DA/MTR"
```

Description Returns the text that appears next to Suffix on the System Overview screen, which can be accessed by pressing UTILITY.

:SYSTem:TIME

Function Sets or queries the time.

Syntax
```
:SYSTem:TIME {<String>}
:SYSTem:TIME?
<String> = "HH:MM:SS" (HH = hour, MM
= minute, SS = second)
```

Example
```
:SYSTEM:TIME "14:30:00"
:SYSTEM:TIME? -> "14:30:00"
```

:SYSTem:USBKeyboard

Function Sets or queries the USB keyboard type.

Syntax
```
:SYSTem:USBKeyboard {JAPANese|
ENGLish}
:SYSTem:USBKeyboard?
```

Example
```
:SYSTEM:USBKEYBOARD JAPANESE
:SYSTEM:USBKEYBOARD? ->
:SYSTEM:USBKEYBOARD JAPANESE
```

5.21 WAVeform Group

The commands in this group deal with the acquired waveform data.
There are no front panel keys that correspond to the commands in this group.

:WAVeform?

Function Queries all waveform display data output settings.
Syntax `:WAVeform?`

:WAVeform:BYTeorder

Function Sets or queries the output byte order of the waveform display data (FLOAT format) that is transmitted by the :WAVeform:SEND? command.
Syntax
```
:WAVeform:BYTeorder {LSBFirst|
MSBFirst}
:WAVeform:BYTeorder?
```
Example
```
:WAVEFORM:BYTEORDER MSBFIRST
:WAVEFORM:BYTEORDER? ->
:WAVEFORM:BYTEORDER MSBFIRST
```
Description This command is valid when :WAVeform:FORMat is set to FLOat.

:WAVeform:END

Function Sets or queries the output end point of the waveform display data that is transmitted by the :WAVeform:SEND? command.
Syntax
```
:WAVeform:END {<NRf>}
:WAVeform:END?
<NRf> = 0 to 1601
```
Example
```
:WAVEFORM:END 1601
:WAVEFORM:END? ->
:WAVEFORM:END 1601
```

:WAVeform:FORMat

Function Sets or queries the format of the waveform display data that is transmitted by the :WAVeform:SEND? command.
Syntax
```
:WAVeform:FORMat {ASCii|FLOat}
:WAVeform:FORMat?
```
Example
```
:WAVEFORM:FORMAT FLOAT
:WAVEFORM:FORMAT? ->
:WAVEFORM:FORMAT FLOAT
```
Description For information about the differences in waveform display data output between formats, see the description of the :WAVeform:SEND? command.

:WAVeform:HOLD

Function Sets or queries the on/off (hold/release) status of the waveform display data hold feature for all waveforms.
Syntax
```
:WAVeform:HOLD {<Boolean>}
:WAVeform:HOLD?
```
Example
```
:WAVEFORM:HOLD ON
:WAVEFORM:HOLD? ->
 :WAVEFORM:HOLD 1
```
Description
- If :WAVeform:HOLD is set to ON before :WAVeform:SEND? is executed, all the waveform data at that point can be held internally.
- As long as :WAVeform:HOLD is set to ON, waveform data is held even when the waveform display on the screen is updated.
- For example, if you want to acquire U1 and I1 waveform display data at the same point in time, use the following commands:

```
:WAVeform:HOLD ON
:WAVeform:TRACe U1
:WAVeform:SEND?
```
(Receive the waveform display data of U1.)
```
:WAVeform:TRACe I1
:WAVeform:SEND?
```
(Receive the waveform display data of I1.)
```
:WAVeform:HOLD OFF
```
- If :WAVeform:HOLD is set to ON after having already been set to ON before, the waveform display data is cleared, and the most recent waveform data is held internally.When retrieving waveform display data continuously, this method can be used to circumvent the need to repeatedly set :WAVeform:HOLD to OFF.

:WAVeform:LENGth?

Function Queries the total number of points of the waveform specified by the :WAVeform:TRACe command.
Syntax `:WAVeform:LENGth?`
Example `:WAVEFORM:LENGTH? -> 1602`
Description The number of data points is fixed.This command always returns 1602.

:WAVeform:SEND?

Function Queries the waveform display data specified by the :WAVeform:TRACe command.

Syntax `:WAVeform:SEND?`

Example
- When :WAVeform:FORMat is set to ASCii:
  `:WAVEFORM:SEND? -> <NR3>,<NR3>,...`
- When :WAVeform:FORMat is set to FLOat:
  `:WAVEFORM:SEND? -> #4? (4-digit number of bytes)(data byte sequence)`

Description The format of the waveform display data that is output varies depending on how the :WAVeform:FORMat command is set. The different formats are explained below.
(1) When the format is set to ASCii:
Physical values are output in <NR3> format.The points are separated by commas.
(2) When the format is set to FLOat:
Physical values are output in IEEE single-precision floating point (4-byte) format.
The output byte order of the data of each point follows the order that is set by using the :WAVeform:BYTeorder command.

:WAVeform:SRATe?

Function Queries the sample rate of the acquired waveform.

Syntax `:WAVeform:SRATe?`

Example `:WAVEFORM:SRATE? -> 32.000E+03`

:WAVeform:STARt

Function Sets or queries the output start point of the waveform display data that is transmitted by the :WAVeform:SEND? command.

Syntax
```
:WAVeform:STARt {<NRf>}
:WAVeform:STARt?
```
`<NRf> = 0 to 1601`

Example
```
:WAVEFORM:START 0
:WAVEFORM:START? ->
:WAVEFORM:START 0
```

:WAVeform:TRACe

Function Sets or queries the target waveform for the :WAVeform:SEND? command.

Syntax
```
:WAVeform:TRACe {U<x>|I<x>|SPEed|TORQue|AUX<x>}
:WAVeform:TRACe?
```
`U<x> and I<x>'s <x> = 1 to 6 (element)`
`AUX<x>'s <x> = 1 or 2 (AUX input channel)`

Example
```
:WAVEFORM:TRACE U1
:WAVEFORM:TRACE? ->
:WAVEFORM:TRACE U1
```

Description
- SPEed and TORQue can only be selected on models with the motor evaluation function (/MTR) option.
- AUX<x> can only be selected on models with the auxiliary input (/AUX) option.

:WAVeform:TRIGger?

Function Queries the trigger position of the acquired waveform.

Syntax `:WAVeform:TRIGger?`

Example `:WAVEFORM:TRIGGER? -> 0`

Description Because the trigger position is always at the beginning of the waveform display data, 0 is returned.

5.22 Common Command Group

The commands in this group are defined in IEEE 488.2-1992 and are independent from the instrument's individual functions.There are no front panel keys that correspond to the commands in this group.

***CAL?**

Function Executes zero calibration (zero-level compensation, the same operation as pressing CAL—SHIFT+SINGLE) and queries the result.
Syntax `*CAL?`
Example `*CAL? -> 0`
Description If the calibration ends normally, 0 is returned. If an error is detected, 1 is returned.

***CLS**

Function Clears the standard event register, extended event register, and error queue.
Syntax `*CLS`
Example `*CLS`
Description
- If the *CLS command is located immediately after the program message terminator, the output queue is also cleared.
- For information about each register and queue, see chapter 6.

***ESE**

Function Sets or queries the standard event enable register.
Syntax `*ESE {<NRf>}`
`*ESE?`
`<NRf> = 0 to 255`
Example `*ESE 251`
`*ESE? -> 251`
Description
- Specify the value as a sum of the values of each bit in decimal format.
- For example, specifying *ESE 251 will cause the standard enable register to be set to 11111011.In this case, bit 2 of the standard event register is disabled. This means that bit 5 (ESB) of the status byte register is not set to 1, even if a query error occurs.
- The default value is *ESE 0 (all bits disabled).
- A query using *ESE? will not clear the contents of the standard event enable register.
- For information about the standard event enable register, see page 6-4.

***ESR?**

Function Queries and clears the standard event register.
Syntax `*ESR?`
Example `*ESR? -> 32`
Description
- A sum of the values of each bit is returned in decimal format.
- When an SRQ is sent, you can check what types of events have occurred.
- For example, if a value of 32 is returned, this indicates that the standard event register is set to 00100000.This means that the SRQ occurred due to a command syntax error.
- A query using *ESR? will clear the contents of the standard event register.
- For information about the standard event register, see page 6-4.

***IDN?**

Function Queries the instrument model.
Syntax `*IDN?`
Example `*IDN? ->`
`YOKOGAWA,WT1806-06,123456789,F1.01`
Description
- The information is returned in this form: <Manufacturer>, <Model>, <Serial no.>, <Firmware version>.
- <Model> is returned in the following format: "six-digit model code—two-digit element structure."For details on the model code and element structure, see "Checking the Package Contents" in the getting started guide, IM WT1801-03EN.

***OPC**

Function Sets bit 0 (the OPC bit) of the standard event register to 1 upon the completion of the specified overlap command.
Syntax `*OPC`
Example `*OPC`
Description
- For information about how to synchronize a program using *OPC, see page 4-8.
- The COMMunicate:OPSE command is used to specify the overlap command.
- If *OPC is not the last command of the message, its operation is not guaranteed.

*OPC?

Function Returns ASCII code 1 if the specified overlap command has finished.

Syntax `*OPC?`

Example `*OPC? -> 1`

Description
- For information about how to synchronize a program using *OPC, see page 4-8.
- The COMMunicate:OPSE command is used to specify the overlap command.
- If *OPC? is not the last command of the message, its operation is not guaranteed.

*OPT?

Function Queries the installed options.

Syntax `*OPT?`

Example `*OPT? -> EX6,B5,G5,DT,FQ,V1,DA,MTR`

Description
- Returns the presence of the following options: the external current sensor input option (EX1 for the WT1801, EX2 for the WT1802, EX3 for the WT1803, EX4 for the WT1804, EX5 for the WT1805, and EX6 for the WT1806), the built-in printer (B5), the harmonic measurement option (G5), the simultaneous dual harmonic measurement option (G6), the delta computation option (DT), the add-on frequency measurement option (FQ), the RGB output option (V1), the 20-channel D/A output option (DA), the motor evaluation function (MTR), and the auxiliary input option (AUX).
- If none of the options are installed, ASCII code 0 is returned.
- The *OPT? query must be the last query of a program message.
  An error occurs if there is a query after the *OPT query.

*RST

Function Initializes the settings.

Syntax `*RST`

Example `*RST`

Description
- Also clears *OPC and *OPC? commands that have been sent.
- All settings except communication settings are reset to their factory default values.

*SRE

Function Sets or queries the service request enable register.

Syntax `*SRE {<NRf>}`
`*SRE?`
`<NRf> = 0 to 255`

Example `*SRE 239`
`*SRE? -> 175 (because the bit 6, MSS, setting is ignored)`

Description
- Specify the value as a sum of the values of each bit in decimal format.
- For example, specifying *SRE 239 will cause the standard enable register to be set to 11101111.In this case, bit 4 of the service request enable register is disabled. This means that bit 4 (MAV) of the status byte register is not set to 1, even if the output queue is not empty.
- Bit 6 (MSS) of the status byte register is the MSS bit itself and is therefore ignored.
- The default value is *SRE 0 (all bits disabled).
- A query using *SRE? will not clear the contents of the service request enable register.
- For information about the service request enable register, see page 6-3.

*STB?

Function Queries the status byte register.

Syntax `*STB?`

Example `*STB? -> 4`

Description
- A sum of the values of each bit is returned as a decimal value.
- Because the register is read without executing serial polling, bit 6 is an MSS bit, not an RQS bit.
- For example, if a value of 4 is returned, this indicates that the status byte register is set to 00000100.This means that the error queue is not empty (in other words, an error occurred).
- A query using *STB? will not clear the contents of the status byte register.
- For information about the status byte register, see page 6-3.

*TRG

Function Executes single measurement (the same operation as when SINGLE is pressed).

Syntax `*TRG`

Example `*TRG`

Description A multi-line message GET (Group Execute Trigger) will perform the same operation as this command.

***TST?**

Function Performs a self-test and queries the result.

Syntax `*TST?`

Example `*TST? -> 0`

Description
- The self-test consists of tests of each kind of internal memory.
- This command returns 0 if the self-test is successful and 1 if it is not.If the condition of the WT1800 prevents the self-test from being executed (this happens for example if the WT1800 is performing integration or storage), the WT1800 will return an appropriate error code.
- It takes approximately 30 seconds for the test to complete.When receiving a response from the WT1800, set the timeout to a relatively large value.

***WAI**

Function Holds the execution of the subsequent command until the completion of the specified overlap command.

Syntax `*WAI`

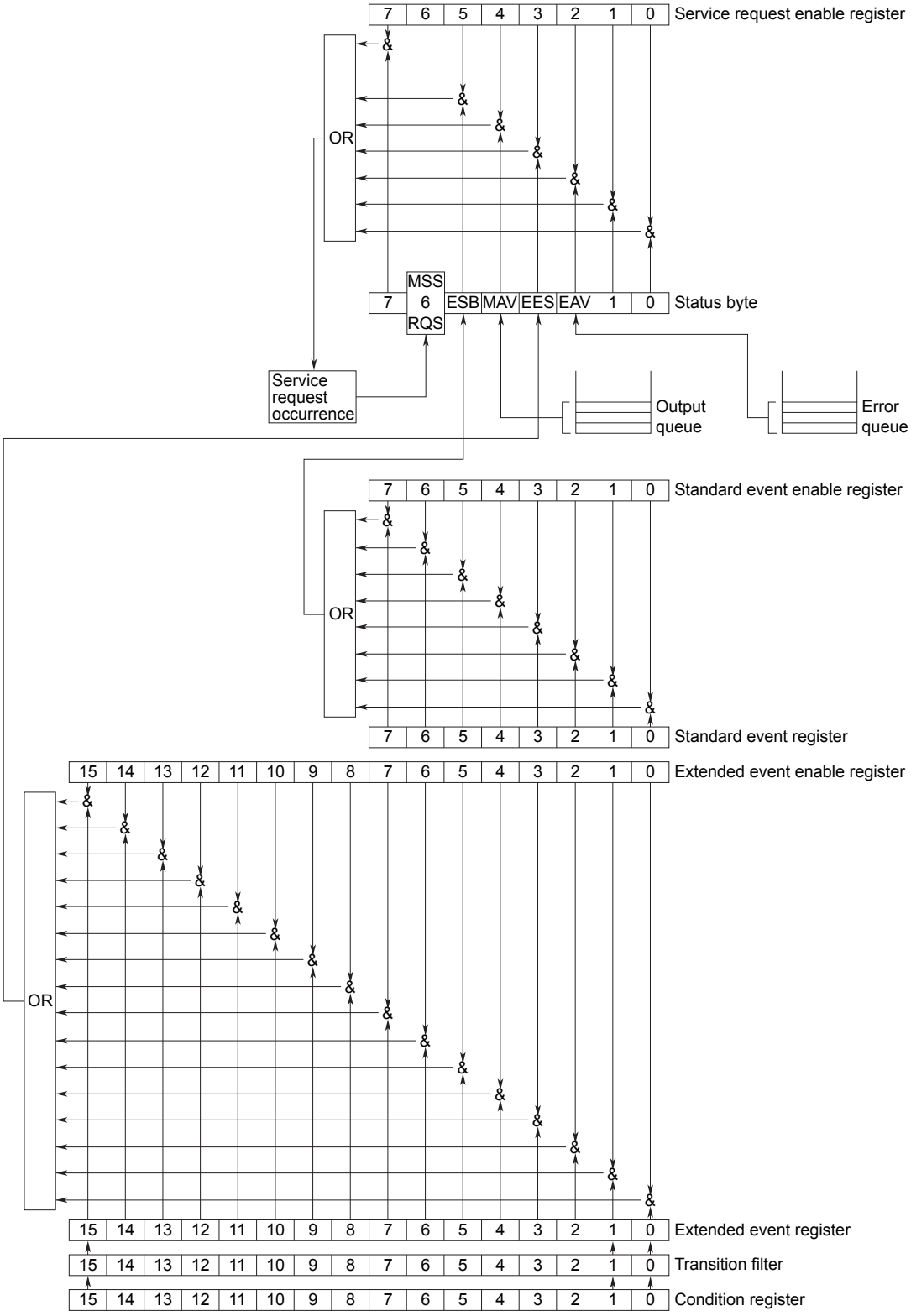
Example `*WAI`

Description
- For information about how to synchronize a program using *WAI, see page 4-8.
- The COMMunicate:OPSE command is used to specify the overlap command.

6.1 About Status Reports

Status Reports

The figure below shows the format of status reports that are read by serial polling. This status report format is an extended version of the status report format defined in IEEE 488.2-1992.


7 6 5 4 3 2 1 0
Service request enable register
&
OR
MSS
7 6 RQS ESB MAV EES EAV 1 0
Status byte
Service request occurrence
Output queue
Error queue
7 6 5 4 3 2 1 0
Standard event enable register
Standard event register
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Extended event enable register
Extended event register
Transition filter
Condition register

Overview of Registers and Queues

Name	Function	Writing	Reading
Status byte	–	–	Serial polling (RQS), *STB? (MSS)
Service request enable register	Status byte mask	*SRE	*SRE?
Standard event register	Indicates device status changes	–	*ESR?
Standard event enable register	Standard event register mask	*ESE	*ESE?
Extended event register	Indicates device status changes	–	STATus:EESR?
Extended event enable register	Extended event register mask	STATus:EESE	STATus:EESE?
Condition register	Current device status	–	STATus:CONDition?
Transition filter	Conditions that change the extended event register	STATus:FILTer<x>	STATus:FILTer<x>?
Output queue	Stores response messages for queries	Query commands	
Error queue	Stores error numbers and messages	–	STATus:ERRor?

Registers and Queues That Affect the Status Byte

The following registers affect the status byte bits.

Register	Affected Status Byte Bit
Standard event register	Sets bit 5 (ESB) to 1 or 0
Output queue	Sets bit 4 (MAV) to 1 or 0
Extended event register	Sets bit 3 (EES) to 1 or 0
Error queue	Sets bit 2 (EAV) to 1 or 0

Enable Registers

The following registers are used to mask a bit so that the bit will not affect the status byte even when the bit is set to 1.

Masked Register	Mask Register
Status byte	Service request enable register
Standard event register	Standard event enable register
Extended event register	Extended event enable register

Reading and Writing to Registers

For example, you can use the *ESE command to set the standard event enable register bits to ones and zeros. You can use the *ESE? command to query whether the standard event enable register bits are ones or zeros. For details on these commands, see chapter 5.

6.2 Status Byte

Status Byte

7	RQS 6 MSS	ESB	MAV	EES	EAV	1	0

- **Bits 0, 1, and 7**
  Not used (always 0)
- **Bit 2 EAV (Error Available)**
  This bit is set to 1 when the error queue is not empty. In other words, this bit is set to 1 when an error occurs. For details, see page 6-6.
- **Bit 3 EES (Extend Event Summary Bit)**
  This bit is set to 1 when the logical AND of the extended event register and the extended event enable register is 1. In other words, this bit is set to 1 when a certain event takes place inside the instrument. For details, see page 6-5.
- **Bit 4 MAV (Message Available)**
  This bit is set to 1 when the output queue is not empty. In other words, this bit is set to 1 when there is data to be transmitted in response to a query. For details, see page 6-6.
- **Bit 5 ESB (Event Summary Bit)**
  This bit is set to 1 when the logical AND of the standard event register and the standard event enable register is 1. In other words, this bit is set to 1 when a certain event takes place inside the instrument. For details, see page 6-4.
- **Bit 6 RQS (Request Service)/ MSS (Master Status Summary)**
  This bit is set to 1 when the logical AND of the status byte (excluding bit 6) and the service request enable register is 1. In other words, this bit is set to 1 when the instrument requests service from the controller. RQS is set to 1 when the MSS bit changes from 0 to 1 and is cleared when serial polling is carried out or when the MSS bit changes to 0.

Bit Masking

To mask a bit in the status byte so that it does not cause an SRQ, set the corresponding bit of the service request enable register to 0.
For example, to mask bit 2 (EAV) so that service is not requested when an error occurs, set bit 2 of the service request enable register to 0. Do this using the `*SRE` command. To query whether each bit of the service request enable register is 1 or 0, use `*SRE?`. For details on the `*SRE` command, see chapter 5.

Status Byte Operation

A service request is issued when bit 6 in the status byte becomes 1. Bit 6 is set to 1 when any other bit becomes 1 (when the corresponding bit of the service request enable register is also set to 1). For example, if an event occurs and the logical AND of a standard event register bit and its corresponding enable register bit is 1, then bit 5 (ESB) is set to 1. At this point, if bit 5 of the service request enable register is 1, bit 6 (MSS) is set to 1, and the WT1800 requests service from the controller.
You can check what type of event occurred by reading the contents of the status byte.

Reading the Status Byte

There are two ways to read the contents of the status byte.

- ***STB? query**
  Bit 6 functions as MSS when a query is made using `*STB?`. This causes the MSS to be read. This query does not cause any of the status byte bits to be cleared after the status byte is read.
- **Serial polling**
  Bit 6 functions as RQS when serial polling is issued. This causes the RQS to be read. After the status byte is read, only the RQS bit is cleared. You cannot read the MSS bit when serial polling is used.

Clearing the Status Byte

There is no way to clear all the bits in the status byte. The bits that are cleared for each operation are shown below.

- ***STB? query**
  None of the bits are cleared.
- **Serial polling**
  Only the RQS bit is cleared.
- **When a *CLS command is received**
  When a `*CLS` command is received, the status byte itself is not cleared, but the contents of the standard event register, which affect the bits in the status byte, are cleared. As a result, the corresponding status byte bits are cleared. Because the output queue is not cleared with a `*CLS` command, bit 4 (MAV) in the status byte is not affected. However, the output queue will be cleared if the `*CLS` command is received just after a program message terminator.

6.3 Standard Event Register

Standard Event Register

7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

- **Bit 7 PON (Power ON)**
  This bit is set to 1 when the instrument is turned on.
- **Bit 6 URQ (User Request)**
  Not used (always 0)
- **Bit 5 CME (Command Error)**
  This bit is set to 1 when there is a command syntax error.
  Examples Command names are misspelled, or character data that is not one of the available options has been received.
- **Bit 4 EXE (Execution Error)**
  This bit is set to 1 when the command syntax is correct, but the command cannot be executed in the current state.
  Examples Parameters are out of range, or a command has been received for an option that is not installed.
- **Bit 3 DDE (Device Error)**
  This bit is set to 1 when a command cannot be executed for internal reasons other than a command syntax error or command execution error.
- **Bit 2 QYE (Query Error)**
  This bit is set to 1 when a query command is received, but the output queue is empty or the data is lost.
  Examples There is no response data, or data is lost due to an overflow in the output queue.
- **Bit 1 RQC (Request Control)**
  Not used (always 0)
- **Bit 0 OPC (Operation Complete)**
  This bit is set to 1 upon the completion of the operation designated by the `*OPC` command (see chapter 5 for details).

Bit Masking

To mask a certain bit of the standard event register so that it does not cause bit 5 (ESB) in the status byte to change, set the corresponding bit of the standard event enable register to 0.
For example, to mask bit 2 (QYE) so that ESB will not be set to 1 even if a query error occurs, set bit 2 of the standard event enable register to 0. Do this using the `*ESE` command. To query whether each bit of the standard event enable register is 1 or 0, use `*ESE?`.
For details on the `*ESE` command, see chapter 5.

Standard Event Register Operation

The standard event register indicates eight types of events that occur inside the instrument. When one of the bits in this register becomes 1 (and the corresponding bit of the standard event enable register is also 1), bit 5 (ESB) in the status byte is set to 1.
Example
1. A query error occurs.
2. Bit 2 (QYE) is set to 1.
3. If bit 2 of the standard event enable register is 1, bit 5 (ESB) in the status byte is set to 1.

You can also check what type of event occurred in the WT1800 by reading the contents of the standard event register.

Reading the Standard Event Register

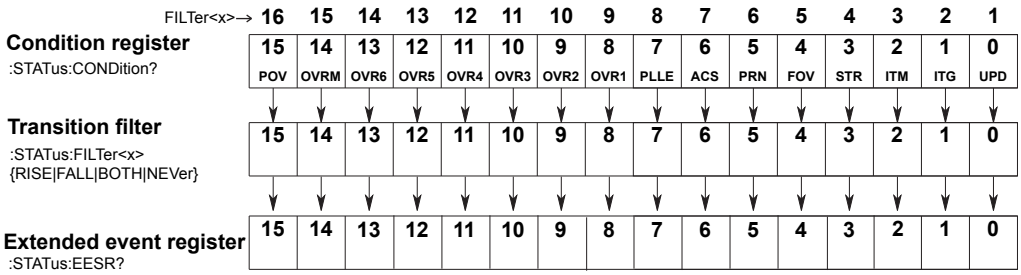
You can use the `*ESR?` command to read the contents of the standard event register. The register is cleared after it is read.

Clearing the Standard Event Register

The standard event register is cleared in the following three cases.
- The contents of the standard event register are read using the `*ESR?` command.
- A `*CLS` command is received.
- The instrument is turned off and then back on.

6.4 Extended Event Register

The extended event register receives information about changes in the condition register, which indicates the instrument's internal condition. The information is the result of edge detection performed by the transition filter.


FILTer<x>→ 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Condition register
:STATus:CONDition?
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
POV OVRM OVR6 OVR5 OVR4 OVR3 OVR2 OVR1 PLLE ACS PRN FOV STR ITM ITG UPD
Transition filter
:STATus:FILTer<x>
{RISE|FALL|BOTH|NEVer}
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Extended event register
:STATus:EESR?
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

The condition register bits are described below.

Bit 0	UPD (Updating)	Set to 1 when the measured data is being updated. UPD changing from 1 to 0 indicates that updating has been completed.
Bit 1	ITG (Integrate Busy)	Set to 1 during integration.
Bit 2	ITM (Integrate Timer Busy)	Set to 1 when the integration timer is operating.
Bit 3	STR (Store Busy)	Set to 1 during storage.
Bit 4	FOV (Frequency Over)	Set to 1 when a frequency error occurs.
Bit 5	PRN (Printing)	Set to 1 when the built-in printer is operating.
Bit 6	ACS (Accessing)	Set to 1 when a drive is being accessed.
Bit 7	PLLE (PLL Source Input Error)	Set to 1 when, during harmonic measurement, there is no PLL source or synchronization cannot be achieved.
Bit 8	OVR1 (Element1 Measured Data Over)	Set to 1 when the voltage or current of element 1 exceeds its range.
Bit 9	OVR2 (Element2 Measured Data Over)	Set to 1 when the voltage or current of element 2 exceeds its range.
Bit 10	OVR3 (Element3 Measured Data Over)	Set to 1 when the voltage or current of element 3 exceeds its range.
Bit 11	OVR4 (Element4 Measured Data Over)	Set to 1 when the voltage or current of element 4 exceeds its range.
Bit 12	OVR5 (Element5 Measured Data Over)	Set to 1 when the voltage or current of element 5 exceeds its range.
Bit 13	OVR6 (Element6 Measured Data Over)	Set to 1 when the voltage or current of element 6 exceeds its range.
Bit 14	OVRM (Motor Measured Data Over)	Set to 1 when the speed or torque of the motor input or auxiliary input AUX1 or AUX2 exceeds its range.
Bit 15	POV (ElementX Input Peak Over)	Set to 1 when a peak over-range is detected on any of the elements.

The transition filter parameters detect changes in the specified condition register bits (numeric suffixes 1 to 16) and overwrite the extended event register in the following ways.

RISE	The specified extended event register bit is set to 1 when the corresponding condition register bit changes from 0 to 1.
FALL	The specified extended event register bit is set to 1 when the corresponding condition register bit changes from 1 to 0.
BOTH	The specified extended event register bit is set to 1 when the corresponding condition register bit changes from 0 to 1 or from 1 to 0.
NEVer	Always zero.

6.5 Output and Error Queues

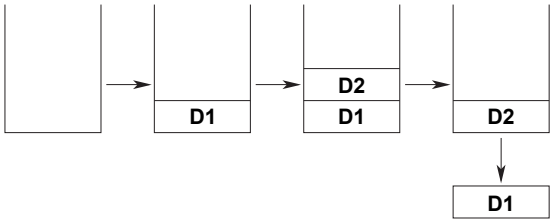
Output Queue

The output queue stores query response messages. For example, if you send a `:WAVeform:SEND?` command, which requests for the transmission of acquired waveform data, the data is stored in the output queue until it is read.

As shown below, data is stored in order and read from the oldest message first. The output queue is cleared in the following cases.

- A new message is received from the controller.
- A deadlock occurs (see page 4-2).
- A device clear command (DCL or SDC) is received.
- The instrument is turned off and then back on.

The `*CLS` command does not clear the output queue. You can determine whether the output queue is empty by checking bit 4 (MAV) in the status byte.



Error Queue

When an error occurs, the error queue stores the error number and message. For example, if the instrument receives an incorrect program message from the controller, the error number (113) and the error message (“Undefined header”) are stored in the error queue when the instrument displays the error message.

You can use the `:STATus:ERRor?` query to read the contents of the error queue. Like those in the output queue, the messages in the error queue are read from the oldest one first.

If the error queue overflows, the last message is replaced with the following message: 350, “Queue overflow”

The error queue is cleared in the following cases.

- A `*CLS` command is received.
- The instrument is turned off and then back on.

You can determine whether the error queue is empty by checking bit 2 (EAV) in the status byte.

Appendix 1 Error Messages

This section explains communication error messages.

- On the WT1800, the messages can be displayed in the language that you specify with the Menu Language setting on the System Config menu. However, any messages that you read from a PC or other controller will be displayed in English.
- If servicing is necessary to solve the problem indicated by a message, contact your nearest YOKOGAWA dealer.
- Only communication error messages are listed here. For details on other error messages, see the user's manual, IM WT1801-02EN.
  - Communication syntax errors 100 to 199
  - Communication execution errors 200 to 299
  - Device-specific and other errors 300 to 399
  - Communication query errors 400 to 499
  - System communication errors 300 and 399

  } Listed below

Communication Syntax Errors (100 to 199)

Code	Message	Corrective Action	Page
102	Syntax error.	A syntax error not covered by error codes 100 to 199.	Chapters 4 and 5
103	Invalid separator.	Separate data values with a comma.	4-1
104	Data type error.	See page 4-6 and 4-7 and use the correct data type for each parameter.	4-6 and 4-7
108	Parameter not allowed.	Check the number of data values.	4-6 and chapter 5
109	Missing parameter.	Be sure to include all necessary data values.	4-6 and chapter 5
111	Header separator error.	Use a comma to separate each header from its data.	4-1
112	Program mnemonic too long.	Check the length of the mnemonic (alphanumeric character string).	Chapter 5
113	Undefined header.	Check the header.	Chapter 5
114	Header suffix out of range.	Check the header.	Chapter 5
120	Numeric data error.	A value must be specified where the syntax contains <NRf>.	4-6
123	Exponent too large.	Where the syntax contains <NR3>, make the exponent that follows E smaller.	4-6 and chapter 5
124	Too many digits.	Limit numeric values to 255 digits or less.	4-6 and chapter 5
128	Numeric data not allowed.	Use a data type other than <NRf>.	4-6 and chapter 5
131	Invalid suffix.	Check the units where the syntax contains <Voltage>, <Current>, <Time>, or <Frequency>.	4-6
134	Suffix too long.	Check the units where the syntax contains <Voltage>, <Current>, <Time>, or <Frequency>.	4-6
138	Suffix not allowed.	Units of measurement can only be used where the syntax contains <Voltage>, <Current>, <Time>, or <Frequency>.	4-6
141	Invalid character data.	Be sure to select one of the listed choices when the syntax contains {...|...|...}.	Chapters 4 and 5
144	Character data too long.	Check the spelling of the strings when the syntax contains {...|...|...}.	Chapter 5
148	Character data not allowed.	Use a data type other than {...|...|...}.	Chapter 5
150	String data error.	Enclose parameters with single or double quotation marks where the syntax contains <string data>.	4-7

Code	Message	Corrective Action	Page
151	Invalid string data.	The parameter is either too long, or it contains an unusable character.	Chapter 5
158	String data not allowed.	Use a data type other than <string data>.	Chapter 5
161	Invalid block data.	<Block data> cannot be used.	4-7 and chapter 5
168	Block data not allowed.	<Block data> cannot be used.	4-7 and chapter 5
171	Missing Right	Equations cannot be used.	—
172	Invalid expression.	Equations cannot be used.	Chapter 5
178	Expression data not allowed.	Equations cannot be used.	Chapter 5
181	Invalid outside macro definition.	The WT1800 does not support the IEEE 488.2 macro specifications.	—

Communication Execution Errors (200 to 299)

Code	Message	Corrective Action	Page
221	Setting conflict.	Check settings that are related to each other.	Chapter 5
222	Data out of range.	Check the ranges of the settings.	Chapter 5
223	Too much data.	Check data byte lengths.	Chapter 5
224	Illegal parameter value.	Check the ranges of the settings.	Chapter 5
225	OverFlow.	Keep program messages (including <PMT>) to 1024 bytes or less in length.	4-2
226	Out Of Memory.	Keep program messages (including <PMT>) to 1024 bytes or less in length.	4-2
241	Hardware missing.	Check that the specified options are all installed.	—
260	Expression error.	Equations cannot be used.	—
270	Macro error.	The WT1800 does not support the IEEE 488.2 macro specifications.	—
272	Macro execution error.	The WT1800 does not support the IEEE 488.2 macro specifications.	—
273	Illegal macro label.	The WT1800 does not support the IEEE 488.2 macro specifications.	—
275	Macro definition too long.	The WT1800 does not support the IEEE 488.2 macro specifications.	—
276	Macro recursion error.	The WT1800 does not support the IEEE 488.2 macro specifications.	—
277	Macro redefinition not allowed.	The WT1800 does not support the IEEE 488.2 macro specifications.	—
278	Macro header not found.	The WT1800 does not support the IEEE 488.2 macro specifications.	—

Communication Query Errors (400 to 499)

Code	Message	Corrective Action	Page
410	Query INTERRUPTED.	Check the transmission and reception order.	4-2
420	Query UNTERMINATED.	Check the transmission and reception order.	4-2
430	Query DEADLOCKED.	Keep program messages (including <PMT>) to 1024 bytes or less in length.	4-2
440	Query UNTERMINATED after indefinite response.	Do not write a query after *IDN? or *OPT?.	—

System Communication Errors (300 and 399)

Code	Message	Corrective Action	Page
300	Communication device-specific error.	Servicing required.	—
399	Fatal error in the communication driver.	Servicing required.	—

Communication Warning (50)

Code	Message	Corrective Action	Page
50	*OPC/? exists in message.	Write *OPC or *OPC? at the end of program messages.	—

Other Error (350)

Code	Message	Corrective Action	Page
350	Queue overflow.	Read the error queue.	6-6

Note

Code 350 occurs when the error queue overflows. This error is only returned in response to a `:STATus:ERRor?` query; it is never displayed on the screen.

Appendix 2 About the IEEE 488.2-1992 Standard

The WT1800's GP-IB interface conforms to the IEEE 488.2-1992 standard. This standard specifies that the following 23 items be stated in the document. This section describes these items.

(1) Of the IEEE 488.1 interface features, the subsets that are supported
See section 3.2, "GP-IB Interface Features and Specifications."

(2) The operation of the device when it is assigned an address outside the 0 to 30 range
The address of this instrument cannot be set to an address outside the 0 to 30 range.

(3) Reaction of the device when the user changes the address
The address change is detected when the user presses UTILITY and then the Remote Ctrl soft key, and changes the address. The new address is valid until the next time it is changed.

(4) Device settings at power-up. The commands that can be used at power-up.
As a basic rule, the previous settings (the settings that were in use when the WT1800 was turned off) are used.
There are no limitations on the commands that can be used at power-up.

(5) Message exchange options
- **(a) Input buffer size**
  1024 bytes
- **(b) Queries that return multiple response messages**
  See the examples of the commands given in chapter 5.
- **(c) Queries that create response data when the command syntax is being analyzed**
  All queries create response data when the command syntax is analyzed.
- **(d) Queries that create response data during reception**
  There are no queries of which the response data are created upon receiving a send request from the controller.
- **(e) Commands that have parameters that restrict one another**
  See the examples of the commands given in chapter 5.

(6) Items that are included in the functional or composite header elements constituting a command
See chapters 4 and 5.

(7) Buffer sizes that affect block data transmission
When block data is being transmitted, the output queue is expanded to match the size of the data that is being transmitted.

(8) A list of program data elements that can be used in equations and their nesting limitations
Equations cannot be used.

(9) Syntax of the responses to queries
See the examples of the commands given in chapter 5.

(10) Communication between devices that do not follow the response syntax
Not supported

(11) Size of the response data block
1 to 2000000 bytes

(12) A list of supported common commands
See section 5.22, "Common Command Group."

(13) Device condition after a successful calibration
The device will be performing measurements.

(14) The maximum length of block data that can be used for the *DDT trigger macro definition
Not supported

(15) The maximum length of the macro label for defining macros, the maximum length of block data that can be used for the macro definition, and the process when recursion is used in macro definitions
Macro functions are not supported.

(16) Reply to the *IDN? query
See section 5.22, "Common Command Group."

(17) Size of storage area for protected user data for *PUD and *PUD?
*PUD and *PUD? are not supported.

(18) The length of the *RDT and *RDT? resource names
*RDT and *RDT? are not supported.

(19) The change in the status due to *RST, *LRN?, *RCL, and *SAV
RST
See section 5.22, "Common Command Group."
LRN?, *RCL, and *SAV
These common commands are not supported.

(20) The extent of the self-test using the *TST? command
Performs the same internal memory test that is executed when the user presses UTILITY and then the Self Test soft key, and executes the MEMORY test.

(21) The structure of the extended return status
See chapter 6.

(22) Whether each command is processed in an overlapped manner or sequentially
See section 4.5, "Synchronization with the Controller" and chapter 5.

(23) The description of the execution of each command
See the explanations of each command's function in chapter 5; the features guide, IM WT1801-01EN; and the user's manual, IM WT1801-02EN.

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